

THE RETURN TO RELIGION



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THE RETURN TO RELIGION

By

Henry C. Link, Ph.D.



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of which had not been fully worked out. Nor have I been able to describe, except by indirect reference, Supply in the Indian States, which are making a sizable contribution to victory. I had no time to visit them, and the response to my written enquiries gave me insufficient data for my purposes. I could not wait, and had to hurry on to my next subject. Indeed, it has been the case with much of the book that the development of Supply policy and practice has been so comprehensive and continuous, that at no point could I feel that what I had written represents the last word on any aspect of the subject.

I should like to place on record the very considerable debt which I owe to departmental officials, works managers and business executives, all of whom have borne my importunities with patience and courtesy.

Calcutta, October 1942.

GEOFFREY W. TYSON

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CHAPTER I

INTRODUCTORY

Quite recently a member of the House of Commons, in a question which appeared to be addressed to the world at large as much as to the Secretary of State for India, asked whether it was not "about time, with 400,000,000 people, to start making something vital to the war." So far as I am aware no answer was given to this rhetorical interpellation, which clearly did not proceed entirely from a spirit of enquiry. This book is an attempt to show what some at least of India's four hundred million people are doing to further the Commonwealth's war effort. My first intention was to call it "Journey through Wartime India" but, on further reflection, I realised that such a title might be misleading, for it would imply a much wider itinerary than the one I have followed. Such a journey would have had to include an account of the training and creation of India's enlarged Defence Services, whereas I have concerned myself solely with the subject of Supply and its part in enabling the Indian Army, the Royal Indian Navy and the Indian Air Force to meet the new and heavy responsibilities which the war has brought to them. In the pages that follow I have tried to write of Supply in the generic and all-embracing sense, and not merely of the Supply Department. It is Supply with a capital S, but as far as possible I have endeavoured to tell the story simply and without recourse to the many technical formulae which are inevitably associated with a highly com-

plex affair, for what follows hereafter is intended to provide the general public with a tough but reliable guide to a subject upon which volumes might be written. I am more anxious that it should commend itself to the layman as a fairly clear picture of one of our main contributions to the cause than that it should meet with the unqualified approbation of the relatively small handful of experts who are engaged in the business of Supply. That may seem ungracious to a body of men to whom I am deeply indebted for the patience with which they have received my questions throughout the several months in which I have been engaged in making my enquiry. But the fact is that this book was not written for their edification, but as an attempt to tell India herself, and then perhaps a larger audience, of India's many-sided achievement in the field of War Supply, and to show how it dovetails into the greater Commonwealth-plus-U. S. plan for victory. "India Arms For Victory" is not just a propaganda slogan. To those of you who do me the honour of reading this book I hope to prove that it is a fact of very great consequence to the cause of freedom wherever it is being defended.

My investigations did not take the form of one long journey through wartime India, during which the subject unfolded itself like a panorama before my eyes. On the contrary, my peregrinations have been irregular, and perchance have had to be fitted into the pattern of an otherwise busy existence. Inevitably, therefore, I have been unable to visit all the places that one ought to for the purposes of such a survey, but I did see and hear enough in the course of many hundreds of miles of travel to enable me to get the picture of Indian Supply as a whole into focus, and to relate it to the major problems of strategy. At no time, before or during the writing of this book, have I attempted to catalogue,

according to the circumstances of their production, the thirty-seven thousand items of armament and supply which India is making. Because, soon after I began to study my subject I realised that, unless I kept my eyes fixed on essentials, I was in very real danger of getting irretrievably bogged in a mass of detail which, though impressive enough in its way, is but a part of the story. It would have been quite impossible to collect data for a book of this kind without official sanction and approval, and in consequence certain special facilities have been accorded to me which may have created the impression that I have been appointed a sort of special chronicler to the Department of Information or the Department of Supply. This is not the case, though obviously I have throughout maintained close touch with these two branches of Government. But that does not mean that I sacrificed the right to examine and to criticise the facts and figures that were put before me. Nor does it imply that what appears in succeeding chapters is necessarily approved by Government. Subject to the exigencies of wartime censorship, which exists to suppress information that might be of use to the enemy and not to promote the publication of *apologia* for this or that department of state, what is written herein is exclusively a matter between myself and the publishers. Finally, I should like to record that whilst I have tried to eliminate the use of the first person singular as much as possible, I have not always been able so to do. In spite of my best endeavours the little word has crept into the story far more often than I really like. To those who think I might well have expressed my ego far less frequently, I apologise. So much by way of personal explanation and introduction.

What of Supply itself? Let me be clear at the outset that this is not just a history of the Supply Department, large, important and complex as the latter is. For Supply spills over into a number of Departments such as Finance, Defence and Commerce and later on it will be necessary to say something about all of them. That very roughly is the administrative set-up, though of course in the popular mind Supply and the Supply Department are one and indivisible. Almost equally important, I think, is the necessity of remembering that distances in India are considerable and industries, particularly war industries, are far apart and somewhat off the beaten track. One does not just encounter them in the course of an ordinary journey as one might, say, in Britain. India's war industries have to be looked for and searched out with some intelligence. Nor, when found will the conventional analogies, such as that Cawnpore is the Manchester of the East or that Jamshedpur, not unfairly but perhaps injudiciously claims to be its Sheffield, necessarily hold good. For the war has compelled many innovations and improvisations in this country, no less than in others. The latter may claim to be more advanced industrially, but I doubt if they can prove a whit more resourceful than India, where many things are being done which even a few short months ago would have been considered wildly improbable. However, the vastness of India is proverbial and I need not labour the point. Strategically it may be a good thing that whole industries are far apart, and that units of production are separated by long distances; but to those who are called upon to plan a wartime supply organisation it brings problems of a special kind to which I may make reference later. Nor, for instance, is manpower quite as easy as it seems at first sight. The Member of Parliament whom I have quoted at the

beginning of this chapter is not the only person who has fallen into the error of believing that numbers count for everything. Many people are fond of reminding us that one man in every five alive in the world to-day is an Indian. Statistically the thought is more than interesting; it is positively staggering. But it would be a mistake to relate the figure to war or peace production. There is much more to it than that; though some people who have lived in India for many years, no less than others who have never seen this friendly and enchanting country, seem to think that in some way, which I have never found them able to specify clearly, the figure of four hundred million, men, women and children is significant for war output. Unskilled labour is of only very limited use in the business of Supply, and the fact is that, like every country which finds itself on a war basis, India is suffering from an acute shortage of skilled labour, particularly in the engineering and armaments trades. In such a context the gargantuan totals of her latest census really mean very little. We shall return to this point later on when we come to consider what has been done to meet the demand for trained craftsmen. For the moment I will merely say that in practically every factory and workshop which I visited the training of new men for all kinds of processes was regarded as being almost as important as producing the finished article itself, and was in fact proceeding as a complementary activity. Considerable leeway has been made up in the last twelve or eighteen months, but it will be a long, long time before the figure of four hundred millions has any relevance to India's industrial production, though I suppose some critics will continue to delude themselves and their friends with this hypnotic but unreal figure. And it is quite astonishing how the thought of four hundred million people

gathered together within a single country and under one government seems to bemuse otherwise quite clear thinkers. The late Lord Snowden, who possessed an essentially practical sort of mind, was fond of saying that if only the purchasing power of the four hundred million people was increased by one rupee per annum per head it would result in the sale of millions of £ more of British manufactures in India. It was one of those pleasant mental speculations that have no real validity when we come to examine facts as they are. And so it is with man-power, particularly industrial man-power, in India. The trained craftsman and technician constitutes an almost infinitesimal minority of India's population. Even then not all of them can be exclusively employed on the production of munitions and war stores. In such circumstances the figure of four hundred million means literally nothing.

* * * *

Criticism of the Supply side of India's war effort seems to fall into two main categories. There are those who say that India has done too little; and by way of contrast there are others who think India is being asked to do far too much for a victory from which she claims she has no very great political expectations. Both sets of critics are extremely vocal, and both declaim with a naive disregard of facts which do not always fit in with their argument. I hope that, for some at least, this book may prove that India is neither doing more than she ought, nor less than she can; and that it may serve to remind the critics as a whole that industrial progress, both now and in pre-war days, is mainly conditioned by certain severely practical considerations, which lose none of their force because war or a state of emergency have been proclaimed. I have already referred to man-

power, and I think it is beyond dispute that the creation of a skilled labour force of any size must take time. There is the further fact that, in spite of the rapid assumption by Indians of the highest executive and administrative posts, India continues to import a large proportion of her technicians, and the services of technicians have stood at a premium in every country in the world since the beginning of the war. Never within recent years has there been any lack of capital in India or a reluctance to stake it on new and sometimes speculative projects. But the mobilisation and the training of labour present entirely different problems which set one of the limits to the war effort on the industrial side and explain why some of the biggest concerns in the country are doing everything possible to encourage the recruitment and training of the children of their existing staff. They know the importance of tradition as a factor in efficient workmanship. For the engineering trades, and it is they who are the mainspring of munitions output in any country, there was in any case an initial shortage of skilled labour, and there is, therefore, practically no hope of creating anything like a comfortable surplus of skilled labour, even though apprenticeship conditions and union restrictions are lighter here than elsewhere and the problem of "dilution", as it is known in Britain and America, does not exist at all in India. It looks as though there will be shortages here as elsewhere till the end of the war. As I write, for instance, amongst a formidable list of other tradesmen who are wanted for war work, there is a serious and embarrassing shortage of carpenters for the Indian ship-building industry. Those who say that India is doing too little probably do not know that a carpenter and a joiner, for purposes of marine construction, are two entirely different people. But so it is, and though in the vast pattern of Indian Supply it probably

appears an extremely trifling thing, this shortage of carpenters which persists in spite of our recurring figure of four hundred millions, is holding up an important programme of work.

"Give us the tools and we will finish the job" has become one of the most widely quoted of Mr. Churchill's sayings. The Prime Minister related his words to the whole field of war strategy. Within the narrower context of Indian Supply the cry is every bit as urgent, though it is not just to America that it is addressed. Relatively, our need for tools of all sorts, shapes and sizes has been no less than that of other countries, but like them we have had to wait our turn to share in a supply which in any case was woefully inadequate at the beginning. In its broad outlines the story is not very different from that of Britain in the early days of the war. But Britain, quite correctly, was given quick facilities for making good her deficiencies in such vital things as machine tools, whilst India is necessarily some distance down the list of priorities which are accorded by the authorities in the United States, where, however, she now possesses her own purchasing mission. It is the merest common sense, however, that the range of tools and machinery available is one of the chief factors in determining the nature and volume of India's war output. No engineer or works manager, in civil as distinct from Government's own Ordnance factories, whom I met in the course of the enquiry of which these pages are the result, expressed himself fully satisfied with the tools that he had got or who did not say that he could produce more with more men and more machines. At some point or another almost every one apprehended, or had experienced, checkmate for want of tools or plant. The reader may legitimately ask whose fault it is, and of course to the critics of Category One, such a confession seems proof

positive of their contention that India is doing too little. But going a little further below the surface of things than these persons are wont to go, we can see that India's dilemma is very much the same as that which has faced, or still confronts, all the countries that form the Democratic front. I am not writing as an apologist for government, nor do I want to create the impression that everything in the garden is lovely and going along well enough. It is not. But I completely fail to understand, for instance, how the Government of India can be held responsible for the shortage in civil factories of tools, dies, jigs, fixtures and lay-outs. For that was the crux of the problem at the commencement of the transition from peace to war, and it remains so to-day, though far more has been done to relieve this shortage than most people realise. With a wartime output of more than 700 million dollars worth in 1941—more than three times the maximum output of any World War year or even of the boom year of 1929—Mr. John D. Biggers, the Director of Production in the office of Production Management for U. S. armament output, could recently say, "machine tools are still our major problem; no matter how splendid a job has been done it is still impossible to produce enough new machine tools." Such a *cri de coeur*, coming from such a quarter, throws India's difficulty into bold relief; for our ability to produce machine tools in this country is exceedingly limited, and our opportunities of purchasing them abroad are restricted by circumstances over which we have little direct control. An adequate supply of machine tools is merely one of several major problems in turning over from the mass production of peacetime products to the mass production of new and intricate weapons of defence or war. And when you think of the Indian situation in these terms, ask yourself, dear reader, how many mass producing industrial units

India did, in fact, possess when she first decided to extend armament production to ordinary commercial factories and workshops? It may be tragic that we in India are short of trained men and specialised machines. But the tragedy is to some extent relieved by the thought that we are in precisely the same case as Great Britain or the United States of America, both of whom have set about the task of repairing the omissions without reviling their governments for fools or knaves. And, indeed, India's supplies of both men and machines have vastly improved in the last twelve months.

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So far, we have glimpsed one or two of what we may call the natural obstacles which stand in the way of the smooth conversion of industry from a peace to a war footing. We have seen that the principal difficulties are common to all countries fighting on the Democratic front (and probably to those who are fighting against us), and that in the case of skilled labour and supervision India's problems are even greater than elsewhere. The scarcity of machines and hands competent to tend them is not just due to official obscurantism, or the sinister conspiracies of what are called vested interests. It is inherent in our national economy, which clings to a predominantly agricultural tradition and has evolved on the assumption that men and women in India as elsewhere, will spend the greater part of their years in a world that is at peace. But that does not mean that every effort is not now being made to give India all the men and all the machines that she wants for purposes of war supply. Whatever complacency there may have been in the early or 'phony' stages of the war, and it is probable that in those days of lost opportunities the Indian administration was no better and no worse than others, there is no com-

placency now, and bottle-necks and shortages, from whatever causes they spring, are being tackled with a vigorous realism. Not all of them derive from the natural circumstances of our economy. The difficulty of obtaining manufacturing machinery in Britain and America for India has been exceeded, if anything, by the adverse conditions of sea transport. Though latterly the shipping situation has shown a gratifying improvement, for most of the period of which I write sailings have been fewer and voyages have been longer. Inevitably there have been casualties, and in spite of elaborate precautions, such as spreading consignments of machinery over large numbers of vessels, there have been some grievous disappointments and losses. The safe arrival of a turbine does not compensate for the loss of its companion generator. This is only one of dozens of such instances that might be quoted, but it is one which to my knowledge held back a most important armaments project for no less than eight valuable months. Such are the hazards of war. They are not widely advertised, and it is probable that very large numbers of the general public never give them a thought in their bearing upon Indian Supply. I doubt if critics in Category One think out their full implications, when they say that India is producing far too little. There are other forces at work hampering production, but I must hurry on, and in any case these forces are being slowly but surely eliminated as India's war effort rises to its maximum capacity.

What of the critics in Category Two—those who say that India is doing far too much in proportion to what she may expect to get out of an Allied victory? They employ not one but many arguments, which traverse the political as much as the economic field. I will not attempt to answer them all, for in this book I have endeavoured to keep as far away from political issues as I

can. With great respect it seems to me that advanced nationalist thought is extremely confused on the subject of war production. If it is the genuine conviction of the economic counsellors of *swaraj* that India should not help Britain, the Commonwealth, the United States, China and the conquered countries of Europe because war aims, as they have so far been proclaimed, do not satisfy the aspirations of nationalist India, it seems to me a trifle illogical to complain that purely indigenous enterprise is being thwarted in its desire to produce munitions and stores—even if such a contention happened to be true, which it most certainly is not. I will not examine this argument further, because it has been almost completely demolished by the hard facts of the last eighteen months. There is, however, another aspect of the matter which the leader writers of the nationalist press, who say that this war is none of India's business, appear to overlook. Using the word in its more literal sense it can be said that the war is very much India's business. Quite apart from the new armies which India is raising, and the greatly enlarged R. I. N. and Indian Air Force, all of which have provided hundreds of thousands of young men with a career and their families with an addition to their income in a country in which unemployment is a disease, Supply has increased the tempo of activity in every major industry, and has brought orders and fresh experience to literally dozens of smaller ones. A recent calculation showed that the Supply Department, which as I have said before is not fully synonymous with Supply, was spending more than one crore of rupees per day. I am not attempting at this stage to break down the figure of one crore of rupees per diem in order to show how much goes on account of wages, how much on account of materials, how much is spent in India and how much

abroad. Obviously the great bulk of it goes into wages and materials in this country, and of these two items wages is probably the larger. But the point I want to make is that, in spite of all the fulminations in certain quarters, which first say the war has nothing to do with India and then allege that Indian contractors are not getting their fair share of work or that Indian initiative in the field of Supply is stifled rather than encouraged, India has benefited a great deal more than most belligerents in the economic sphere in the last eighteen months. Would those who are opposed to the war effort prevent, if they could, the expenditure in India of over Rs. 350 crores per annum on war supply? Assuming that only one third of this goes in wages, do they desire to deprive Indian workers of more than one hundred and fifteen crores of rupees worth of wages? Viewed from this angle I doubt if they would find very much support for their assertion that the war is none of India's business. The fact is that those who say they will have none of it are powerless to prevent India's war effort gathering both in momentum and volume; for the business of Supply is now so large a part of the trade of the country, and touches the lives of so many of its workers in some way or another, that it is almost impossible to differentiate between the one and the other. Another of the several forms of criticism which comprise Category Two insinuates that there is a deliberate plan to keep India in a kind of industrial bondage, and that whilst the Dominions are being encouraged to expand their manufacturing capacity, particularly for the purpose of making armaments, India is as far as possible restricted to the production of raw materials and primary products. This allegation was freely made at the time of the Eastern Group Conference, about which more is written later on. There are none so blind as those who

will not see. For obvious reasons the findings of the Eastern Group Conference could not be made public at the time, and I suppose that for the duration of the war they will remain a closely guarded secret which cannot be divulged, even for the purpose of removing so complete a misunderstanding as that which suggests that Britain and the Dominions plotted to exclude India from the industrial benefits that are accruing from the tremendous armaments drive which is now taking place throughout the Empire. Further on in this book reference is made to the new munitions and supply projects in India directly sponsored by His Majesty's Government, and the fair-minded reader will draw his own conclusions. Meanwhile, I may say that the insinuation that India has been treated as the poor relation of the Dominions is just about as creditable to its authors as the allegation, which appeared some time ago in a vernacular newspaper in Bengal that Britain does not pay for what she takes from India, or that if she does the accounts are cooked. I hope that what is written in succeeding chapters will expose such gross libels for the lies they are, and dispel some of the more harmful illusions that exist on the subject of India's Supply policy. What, however, does seem to me to have been a serious defect in the larger conception of supply was the apparent inability of His Majesty's Government in the beginning, to place a number of firm forward orders on the Indian Supply organisation, which not infrequently was left to plan production without any very clear idea of the target figures at which it would ultimately have to aim. That, in spite of this, it was able to gather rapid momentum, even in the early stages of development, is a fact which redounds to the credit of those who were responsible for its conduct.

CHAPTER II

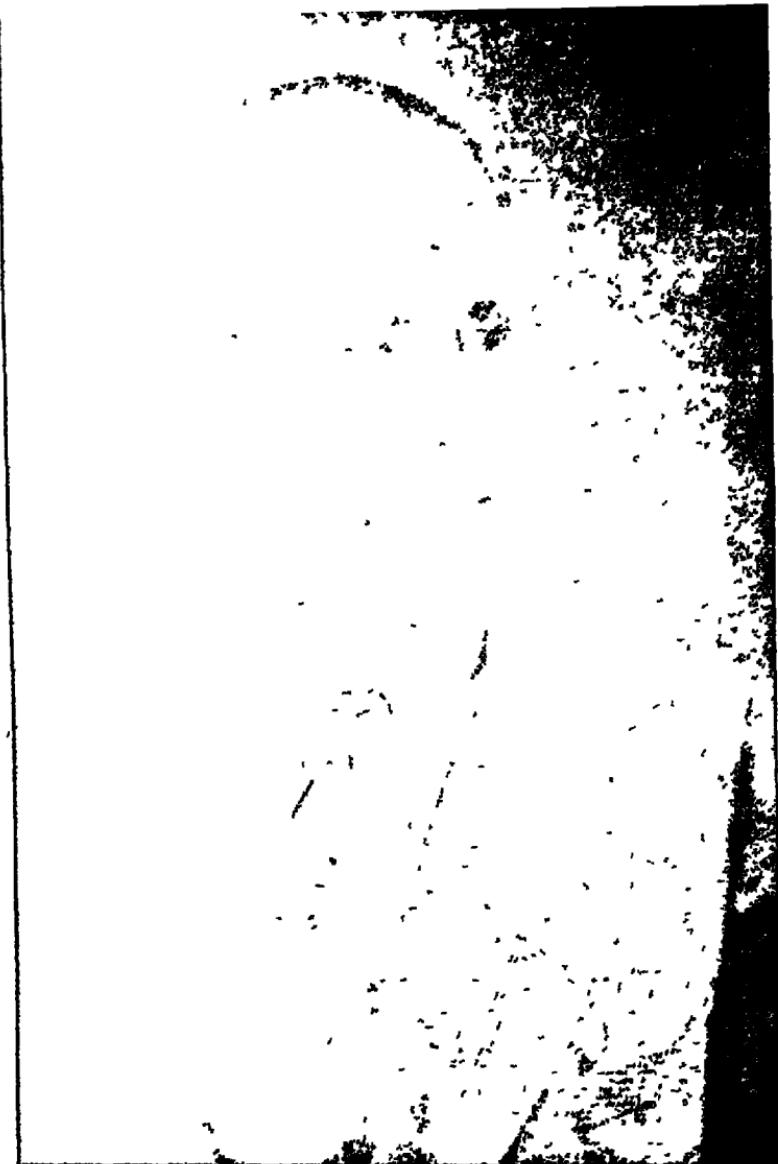
IN THE BEGINNING

Quite obviously, on the declaration of war a complete supply organisation cannot spring into being like Minerva issuing from the head of Jove. No such miracle occurred in the United Kingdom, or later in the United States. Nor could it be so in India. Dividing the subject into its two chief departments—planning and execution—it can be said that planning is always going on, in greater or less degree, even in periods of long and apparently undisturbed peace. Execution begins with a formal declaration of war. Thus, Supply partakes of at least two of those characteristics which are common to all the main branches of strategy. This formula applies to all countries which maintain defence forces, and peacetime activity in the field of Supply largely consists of the collection of data and its interpretation in terms of wartime military requirements. This is followed by the presentation to government of advice as to the action necessary to make the country as far as possible self-supporting in the event of hostilities, in order that it may prosecute the war as vigorously as possible. Apart from the creation of reserves of a limited range of goods and commodities, and the maintenance of production of those things manufactured in the Government's own Ordnance factories, India's pre-war Supply problem might be summed up as having consisted of ascertaining the country's *probable* requirements, its *probable* resources

and their *probable* availability in time of war. It will be seen that the element of probability figured very prominently in an investigation, of which at least a part had perforce to be of a highly speculative nature. Whilst the basic materials essential to armament making and supply could be fairly accurately listed, the extent and the scope of a possible conflict, or the speed at which it might develop could not be predicted with anything like the same assurance. Pre-war students of the problem can hardly have envisaged the early defection of France, which had grave consequences in every department of the war; shipping difficulties have exceeded pre-war expectations rather than otherwise; the effects of bombing upon industrial output in the United Kingdom (to which India still looks for part of her supply of weapons) could not possibly be gauged with any accuracy. Examples of what I may call the imponderables in the situation could easily be multiplied. But uncertainty is of the very essence of war, and it is the unexpected that almost always happens. Inevitably, therefore, pre-war planning had to be of the 'by and large' variety.

* * *

The foregoing roughs in, very sketchily, the background in which pre-war planning of Indian wartime Supply had to begin. Not a few otherwise intelligent laymen, with whom I have discussed the subject during the past two and a half years, appear to labour under the misapprehension that Supply was created suddenly in the first week of September, 1939. In point of fact and time the roots of the organisation go much further back than that. The reverberations of the last war had hardly died away before a fresh study of the problem of creating a supply organisation, which would be



Major-General E. Wood, C.I.E., M.C., Director-General of Supply, was a member of the pre-war departmental committees which first surveyed the subject of Supply. He has been in the Department from the beginning of the war

capable of expansion from peace to war conditions, was inaugurated by Army Headquarters, and the Principal Supply Officers Committee (India) was constituted in 1926, as the Indian counterpart of a similar body which was set up in England under the aegis of the Committee of Imperial Defence. The P.S.O.C. was charged with the task of investigating and making recommendations, from the point of view of the Defence Services in India, as to the most suitable war supply organisation for the country. Its enquiries covered a wide field, and as most of them were of a highly confidential nature practically no publicity could be given at the time, or since, to the enthusiastic and unselfish work of the little band of military officers who undertook this task in addition to their ordinary staff or regimental duties. They prepared a series of reports, on the basis of which an *ad hoc* Committee made recommendations for the creation of a Supply Organisation which was presented to the Government a few weeks before war broke out. The way of the pioneer is always hard, and though the P.S.O.C. received some assistance from the civil departments of Government, all initiative for a long period of years was left to the Defence Services, which in effect meant Army Headquarters. The expense of the Committee fell upon the Defence Budget, which readers will remember was steadily reduced in size during the twenties and early thirties under pressure from the Indian Legislature. Some idea of the restricted conditions in which the Committee had to work can be gleaned from the fact that it was not until 1933 that funds were obtained for a whole-time secretary, who in turn was not provided with an office staff until 1934. But the unflagging enthusiasm of the men who composed the Committee served to carry its work through to a point at which it provided most valuable guidance

to Government when the hour of crisis came.

Before we proceed to view the successive stages by which the present vast supply organisation has been built up, let us take a glance even further backward at the conditions which obtained in the last war. It was not until 1916, i.e., two years after the outbreak of the last war, that the much-criticised Indian Munitions Board came into existence. No such delay took place this time, and to that extent it may be said that India has profited by past experience. Of course, from 1914 to 1916 the business of Supply had been carried on through the media of several principal departments of government, for just as there was a strong individualistic tradition in industry itself, so there persisted the conviction that a department of government, which knew its business, did better on its own initiative than in harness with others. Co-ordination—blessed word—had not then attained its present vogue. But the pressure of events was soon to demonstrate the necessity of a central supply organisation, though even after the Indian Munitions Board was set up certain departments continued to exercise the supply functions which they had assumed at the beginning of the war. I have culled from an official publication, called "The Industrial Handbook," which I believe is now out of print, some information concerning the Board's origin and constitution; and I set down the main facts because they represent the principal body of indigenous experience upon which those who planned Supply in the present war had to draw.

The Board's primary function was the utilisation to the utmost extent of Indian resources in materials of all kind (except food and fodder) required for the prosecution of the war, an object which included, not merely the actual use, wherever possible, of Indian materials

and Indian manufactures, but also the purchase of these and of imported stores on the most advantageous terms. It was in fact predominantly a purchasing organisation, which sought to eliminate competition in buying between the different departments of the public service. The Board had to meet civil as well as military demands for stores, and it became responsible for regulating the demand of India on the United Kingdom for plants and stores manufactured in England, where all available materials and expert labour were required for the task of supplying the needs of the armies in the European fields.

As the Board was organised under war conditions, it was essential to cause as little dislocation as possible among the existing agencies which were supplying war stores. Its development, therefore, though in many ways rapid, was gradual and in accordance with the plan originally designed. The first step was to take over from the departments already administering them all existing supplying agencies which could be readily detached, and could more appropriately be placed under the Board's direction. But no effort was made to make changes for the sake of completeness, and thus the Board refrained from absorbing units which had been previously organised for war purposes in a self-contained manner, and did not in their operations conflict with other agencies. Thus, for instance, the arrangements made by the Commerce and Industries Department for the supply of mica, wolfram and lac were not disturbed.

The position of the Indian Munitions Board in the machinery of Government was really analogous to that of the Railway Board, constituting, with the Army Member, a Department of the Government of India.

It had an organisation at the headquarters of the

Government of India, which was supplemented by provincial organisations in each province. The headquarters staff was divided into well-defined branches, each relating to a subject which for technical or commercial reasons, required centralised control.

The desire to supply the forces based on India from this country, and so to avoid unnecessary demands on the United Kingdom, naturally led to the decrease in stocks of all kinds of imported articles and, in the case of most of them, to great and irregular increases in price. To mitigate this cause of inconvenience, "the Board... ...did its best to increase the manufacturing resources of India, and eventually in order to facilitate compliance with demands and to avoid disturbance of the market caused by emergent buying, made arrangements for the establishment of depots at Calcutta and Bombay for stocks of articles most in demand." The great difference between the last war and this one, so far as Indian Supply policy is concerned, is that whilst the old Indian Munitions Board confined itself to problems of *purchase*, the Supply Department of the present day regards Indian *production* as an equally important branch of its activities. There are, no doubt, some people who think that even now too little has been done to enlarge the field of indigenous manufacture. The new emphasis on production, however, is not just a consequence of India's greater isolation from sources of extraneous supply in this war, or because of the disintegration of strategy as the latter was envisaged in the first, phony nine months of hostilities. It is a measure of the rapid strides made by Indian industry which now finds itself in a position to manufacture a much wider range of articles than was the case 25 years ago, no less than a recognition of the principle repeatedly enunciated by the Government of India in the last

quarter of a century that, subject to certain standards of quality and workmanship, Indian made goods shall be purchased by all Departments of Government in preference to articles of British or foreign manufacture. The old Indian Munitions Board was much concerned to "avoid unnecessary demands on the United Kingdom." Its successor, the Supply Department, is similarly motivated, but in a different way, and for different reasons.

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The crisis of September 1938, which produced the so-called Munich "settlement," led to a quickening of war preparations in every country that might reasonably expect to be involved in the conflict, which was clearly coming. Rearmament was very much in the air and, though the Government of India did not advertise its intentions, by July 1939 plans had been formulated for the creation of the Department of Supply which was destined to come into being the following September. The investigations, which had been undertaken at intervals during the previous few years, had made clear the fundamental nature of some of the problems which the new organisation would have to resolve, and the pace at which it might expect to effect even a partial mobilisation of India's resources. The nature of the struggle in which the Commonwealth was involved, and in which for the period from the collapse of France until the entry of Russia into the war it stood alone, made it clear that India had to put forth her best effort from the beginning. The extent and severity of the war at sea, which imposed severe limitations on the amount of shipping available and the employment of slow moving convoys over longer routes to the East, threw India upon her own resources to an even greater extent

there can have been anticipated in any peacetime planning. If any defects are perceptible in the peacetime planning (and it would have been too much to hope that it would be perfect) it is that those who made the enquiries do not appear to have envisaged a situation in which India might be a large exporter of finished supplies or munitions, though they certainly recognised its importance as a source of supply of raw materials. Another criticism which may be offered is that for too long they contemplated the creation of a supply organisation which was to be mainly advisory in its duties and only to a limited extent executive in its functions. However, by the time the war was upon us this latter misconception had been largely removed. The comparatively limited capacity of Indian industry, and the fact that the more important technical stores had to be imported in the beginning, were the chief problems which the new organisation had to face, and they were not appreciably mitigated by the circumstance that competition for supplies between the various Defence Services is largely eliminated in a country in which they are placed under one department of government. The requirements of the Royal Indian Navy and the Indian Air Force are still small by comparison with those of the Army. And here it will perhaps be helpful if we remember that it is far more important, from the point of view of the war effort as a whole, that the Defence Services should have confidence in the Supply Organisation, than that the latter should be able to satisfy every passing mood of a public whose opinions, in wartime at least, must necessarily be based on an incomplete appreciation of all the issues at stake. As a practical example of what I mean, it is obvious that in the supply system high status must be given to the Private Machine, the working whereof bears heavily

upon commercial enterprise and the civil population generally, and is, therefore, much criticised. In India to-day there are man-power priorities, transport priorities, priorities in raw materials, priorities in imports and exports, which express themselves in terms of quotas, and dozens of other kinds of priorities. Such a complex system inevitably gives rise to grievances and hard cases, some of which are undoubtedly hard to justify. In the course of my work as a newspaper editor many of them have been represented to me, and I cannot deny my sympathy to the individual, or the company, suffering from the operation of rules which are sometimes harsh. But I have not yet met the layman who could see the picture as a whole, for the simple reason that only those who have access to the major objectives of military and economic strategy are in a position to determine impartially the order in which various projects shall rank in supply policy. And the investigations which I have made in order to write this book have confirmed me in this opinion.

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Right at the beginning the Indian Supply Department discovered that it could lay down no hard and fast policy, and that development must largely be a matter of evolution, plentifully interspersed with the processes of trial and error. The first year has been described to me by a high officer of the Department as a "desperate struggle to know what was wanted, having been told you had no time to do it in." It was not a question of evolving order out of chaos, but very largely of grafting on to the existing Ordnance and peacetime supply establishments the ready-to-hand resources of private industry. Elsewhere an attempt is made to show how this has been done, and how or-

dinary commercial enterprise has been encouraged to participate in the vast business of war production. In the second year of its existence it was possible for the Department to contemplate what I may call a forward programme; to plan ahead for itself, for adjacent Empire countries and for our Allies. 'The third year, in which these pages are being written, witnesses the consummation of some of last year's planning. The fruits of earlier labour are being garnered. Let me give a simple illustration. By the end of 1943 India will have as many vehicles in her Army as she had men in it at the end of the last war¹. Work that out, dear reader, in terms of planning, and production. Or again, take a short notice job, which by no flight of imagination could be said to be susceptible to planning ahead. With the entry of Russia into the war the port of Basra on the Persian Gulf, terminus of one of the two main routes into Russia, assumed a new and vital importance. The reconditioning of its docks, sheds and jetties was urgent in order that the unloading of large ocean-going steamers from Britain and America might be facilitated. The work was given to India, and it would be a nice calculation, if one had the necessary details, to assess how many Priorities had to be revised, postponed or completely abolished in consequence. The timber alone required for the purpose runs into gargantuan figures, and the Provincial Forest Services, than whom nobody has worked harder in this war, supplied an urgent order ahead of time. But I am digressing.

Throughout, I have endeavoured to avoid intro-

¹ Taking unarmoured motor vehicles alone, it is significant that while before the war the Indian army possessed only 5,000 there were in service by the summer of 1942 twelve times that number, i.e. 60,000.

ducing into the pattern of this book a mass of complicated statistics. But some figures are unavoidable, and, indeed, useful. Let us examine a selection of representative totals. From the outbreak of war to the end of March 1942 the total value of contracts placed by the Indian Supply Department amounted to just over Rs. 279 crores. This is the equivalent of £208,4613,205 or \$ 838,159,261 and is in addition to the considerable sums spent by the Indian Defence Services direct, which for certain purposes have special purchasing arrangements of their own. By the time these lines appear in print these not inconsiderable totals will have been measurably enhanced, for the monthly purchases of the Supply Department are now running in the neighbourhood of Rs. 20 crores (£15,238,080 or \$ 59,701,480) and this figure is likely to increase rather than decrease as time goes on. Closer examination of the expenditure in January 1942, which we may take as a typical month, reveals that contracts worth Rs. 17 crores were placed by the Directorate-General of Supply, and over Rs. 3½ crores by the Directorate-General of Munitions Production. Cotton textiles topped the list with Rs. 10.3 crores, followed by engineering stores, hardware, etc., with Rs. 3.6 crores, timber and woodware Rs. 1.8 crores, woollen textiles Rs. 1.2 crores, chemicals and oils Rs. 82 lakhs, motor vehicles and parts Rs. 81 lakhs, leather products Rs. 77 lakhs, "miscellaneous" stores Rs. 76 lakhs, food-stuffs Rs. 45 lakhs, and other textiles Rs. 12 lakhs. It so happens that in the month I have chosen for analysis cotton textiles account for slightly more than half the total value of contracts placed; but this is not necessarily the case in every month, and an examination of a wider range of accounts would show that the principal items of purchase vary considerably in

their nature. Business on the scale indicated by these figures can only be carried out by a large and inevitably complex organisation. And such it is. One of the questions which considerably agitated the minds of those who in pre-war days were laying the foundations of India's supply policy was how the men with the necessary administrative and technical experience were to be found to conduct an organisation that was bound to grow rapidly in stature, if not always in wisdom. They felt, and with some justification, that there was a risk of denuding other important departments of Government of their best personnel, and that, in any case India's traditional shortage of trained men would soon assert itself. Viewed in the troubled twilight of a fast disappearing peace, I have no doubt that their apprehensions seemed well grounded. But in point of fact it has not worked out like that, and though the right kind of officers have not always been easy to find, they have in the end been obtained for the vast and still growing Supply organisation. Elsewhere in this book* will be found a chart showing the principal personnel and the ramifications of the Department. I will not attempt to describe the duties of each and every one of the hundreds of officers it now employs, but it is necessary to say something about the main branches of an agency that is organising and spending on a scale never previously contemplated by the Government of India.

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Usually when a businessman makes his initial acquaintance with a department of government his first impressions are that it is unnecessarily complicated. This applies in greater or less degree to businessmen everywhere, and to governments of all countries. In

* Appendix I

India we may not yet have a fully-fledged democratic constitution, but we enjoy a freedom of expression that has hardly been affected by special wartime restrictions. In consequence Supply policy has come in for criticism both on the platform and in the press—criticism which is often bitter and frequently uninformed. British and Indian businessmen complain of delays and departmental deficiencies and obtuseness in much the same way as their confreres in Britain and America. They plead for a “common-sense” approach to problems, but it has to be confessed that their own outlook in these matters is often totalitarian rather than democratic. The tendency is to assume that in matters of speed and efficiency in administration the enemy has a considerable pull over us. It may be so; but what many of these critics overlook is that under a totalitarian regime their complaints would not for one moment be tolerated, much less investigated. I have little doubt that when we come to know the full story the fascist organisation of Supply—whether it be in Germany, Italy, Japan or their satellite countries—will be found to have been no more efficient, no more honest and no more purposeful than our own. It may have produced quicker results in certain ways, but in a long war it will probably be found to be much more wasteful.

The Indian Supply Department maintains close contact with all the principal indenting departments of government mainly, of course, the Defence Department. Supply requirements are based on broad lines of strategy with which the Department is not concerned. It delivers its purchases at depot, and thereafter has no further responsibility for the use to which they are put.

As mentioned above, considerable progress has now been made with forward planning in indenting De-

partments, and the problems of the Supply Department are simplified to the extent that demands are placed on it well ahead of actual requirements. Nonetheless, there must always be a large number of urgent indents received at short notice, which require immediate attention. It is with the placing of a definite demand, whether in the form of an enquiry regarding production and delivery possibilities, or of a firm indent that the true functions of the Supply Department begin, and its responsibilities continue up to the final payment for goods delivered in accordance with the terms of a contract.

Fundamentally, the Department does not differ from other Departments of the Government of India. In charge of it is a Member of His Excellency the Viceroy's Executive Council, responsible to the Council for implementing the general policy of the Government of India in so far as the Department is concerned. In his relation with the Executive, that is with the offices of the Directorates-General, whose business it is actually to carry out this policy and the work of the Department generally, the Member-in-charge is assisted by a Secretariat. The duties of the Secretariat very broadly include the transmission of the general orders of Government to the Executive, including sanctions in cases where the formal sanction of Government is necessary, and the co-ordination of action on issues which react on other Departments of Government, and in all matters requiring formal reference to authorities not under the control of the Government of India. Originally the control of supplies was under one Director-General of Supply, but at a very early stage it became clear that no single organisation could cope with the enormous problems which were constantly looming up, and that some division of labour and decentralisation with separate responsibilities was essential. Two Directorates-



At the outbreak of war H. E. Sir Hugh Dow, Governor of Sind, was Secretary to the Commerce Department and was placed in charge of the newly created Supply Department with the title of Director-General of Supply, the portfolio as Member being held as an additional charge by Sir Zafrulla Khan, then Law Member. Sir Hugh Dow left the Department in January 1941 to take up his present post.

General were accordingly constituted, which may be roughly described as the "hardware" and "soft goods" branches of the Department. The first is the Directorate-General, Munitions Production, situated in Calcutta, a natural choice of headquarters in view of the concentration around that city of the majority of engineering interests in India. This branch deals with munitions production both in Government Ordnance Factories and in Railway and civil factories. I use the word "Munitions" in the widest sense. It not only includes lethal stores, but all stores used by the fighting forces from buildings down to camp kettles, oil cookers, water bottles, etc., etc. In fact, the Directorate-General of Munitions Production deals with practically everything made of metal. The remaining miscellaneous stores are dealt with by a similar organisation in Delhi, under the Director-General, Supply. The main items with which he is concerned are cotton and woollen textiles, leather, food, clothing, timber, chemicals and the majority of miscellaneous stores.

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The responsibility of the Supply Department commences with the placing with it of a definite demand, and its functions fall broadly into two main stages, planning and purchasing, dealt with by separate branches, working in the closest co-operation, and with duties which cannot be entirely separated. The former branch is responsible for co-ordinating productive capacity in respect of particular items, and planning production on the basis of demands. The extent to which the services of this branch are required varies according to the class of goods concerned. In cases (and such cases are getting steadily fewer) where supplies are readily available from stock, Purchase Officers can usually

proceed directly to arrange supply by calling for tenders—limited tenders, single tenders or by negotiation. When, however, owing to the size or some other special feature of the order, the shortness of supplies, or the fact that such commodities have never before been produced in India, special difficulties arise. The Planning Officer is on the job from the beginning, with his knowledge of available stocks and of the potentialities of local industry, which are placed at the disposal of the officer who will ultimately be responsible for the actual purchase. The sources, or possible source of supplies, having been determined, the Purchase Branch take over the responsibility for arranging the actual contract either after calling for tenders, or after negotiation, in which again the Planning Officer is closely involved, or by such method as, in the circumstances, appears to be appropriate. The drawing up of actual contracts, arrangements for delivery in accordance with the indentors' directions and the like, all fall within the sphere of the Purchase Branch. From the beginning considerable assistance has been received from various Industrial Panels which were set up to help the Department. Their advice on the capacity of various industrial concerns, and their help in allocating orders to individual firms, has been of great value.

Such is a rough picture of the Directorates-General. Mention must also be made of the Controllers of Supplies. There are six of these officers with their organisations stationed in the main industrial centres in India—Calcutta, Bombay, Madras, Cawnpore, Lahore and Karachi. The functions of the Controller of Supplies are many, and precise definition is difficult. They extend over the whole field of supply generally, and include responsibility for the smooth working of the whole Supply organisation within their circles. These officers have

considerable purchasing powers without reference to higher authority, and they deal direct with the two Director-Generals. In addition to purely purchasing functions, their duties include the maintenance, directly and through Circle Advisory Committees and Commercial and Industrial associations, of the closest contact with industries in their Circles. They are particularly concerned with questions relating to industrial capacity and its local development. Each is intended to be a guide, philosopher and friend to all suppliers of war stores. The purpose of the Secretariat of each of the Directorates-General have already been indicated. In order to expedite action on matters requiring the Government of India's sanction, and co-ordinating action in cases where a reference is necessary to the central authorities, a Joint Secretary and two Deputy-Secretaries of the Government of India are attached to each Directorate-General, and the Director-General both of Munitions Production and of Supply is himself an ex-officio Additional Secretary to the Government of India. This enables him to pass orders on behalf of the Government of India over a very wide field.

Such in crude outline is the constitution of the Supply Department. Appendix I, which contains a table and particulars of the main groups in one of the Directorates-General, gives those readers who require it further information about organisation and personnel, the total of which now runs into several hundreds. Their recruitment has not presented such difficulties as were at one time feared. Bureaucrats, businessmen, naval and military officers, engineers and scientists have joined together to make a success of one of the biggest undertakings of the war. It has not been possible to make a detailed study of the subject of finance. But in presenting this severely abridged

description of the chief agency of Supply I should add that the concurrence of the Finance Department in all important items of expenditure is obligatory under the Indian constitution. From the beginning, therefore, Financial Advisers have been attached to the Supply Department at every level of the organisation, and they remain in close contact with the Planning and Purchase Branches at each stage of any important scheme or contract. The Directorate-General of Munitions Production has one Joint Financial Adviser, Six Deputy and Assistant Financial Advisers. Deputy Financial Advisers are also attached to each of the controllers of Supplies. By means of this decentralisation, financial advice can be obtained without delay or difficulty. A staff of Cost Accounts Officers also works under the general direction of the Joint Financial Adviser. They are responsible for the investigation of the costs of those contracts, the payment for which depends on the actual cost of production plus a percentage of profit. Finally, there is the Controller of Supply Accounts, whose organisation is responsible for the payment of all bills for supplies ordered by the Supply Department.

So far we have thought of the subject of Supply almost entirely in its domestic aspect. Important as this is, it does not by any means cover the whole field. The Indian Supply Department has close and important contact with other great institutions operating in the same field. Among these are the Eastern Group Council, the Indian Purchasing Mission in America, the U. S. Technical Mission to India, Lease and Lend, the Indian Stores Department and the High Commissioner, the British Ministry of Supply and others. In the next chapter we will proceed to consider the part played by some of these organisations in the development of a Supply policy for India.

CHAPTER III

ROGER MISSION—EASTERN GROUP— LEASE AND LEND

If it is to make its maximum contribution to victory, the Indian Supply structure must fit neatly into its proper place in the grand economic and military design of the United Nations. That is a circumstance which the enterprising manufacturer and the ardent economic counsellor of *swaraj*, sometimes overlook. It may be possible to justify economic nationalism on many counts, but not on the ground that it is a co-operative, self-denying influence which seeks only to serve the best interests of some larger territorial or political group. It is necessary to say this, because the public of India might have been spared a good deal of rather pointless controversy if the simple facts of economic strategy had been better explained to them. As it is they who have come to believe that in war, no less than in peace, some mysterious conspiracy, having its roots in the international capitalist system, exists to suppress India's industrial genius, and that the Indian capitalist *entrepreneur* is fighting a lone and unequal struggle against the forces of reaction. It is no part of my purpose to defend all or any of the actions of the British or Indian Governments, but one feels bound to say that such a picture is grossly overdrawn, and that the extra-Indian aids to Supply, whose activity we will consider in this chapter, were not part of some sinister plot to keep India in economic serv-

dom, but represent a very real effort to raise her manufacturing capacity to the highest possible point. Let us view them in the order of their original appearance on the scene, remembering that each represents a fresh stage in the evolution of a supply policy for India. The only pre-war enquiry that need detain us in this chapter was carried out by the Chatfield Committee, so called because it had at its head Admiral of the Fleet Lord Chatfield. Thereafter came the British Ministry of Supply Mission presided over by Sir Alexander Roger, and consequently more widely known as the Roger Mission. After that the chief landmarks are Eastern Group Supply Council, Lease and Lend and the United States Technical Mission to India. All of these constitute important new points of departure, and it is necessary briefly to examine what each has done to help India's war effort.

In so far as it dealt with the subject of Supply, (for it was appointed to report on other aspects of strategy as well) the Chatfield Committee concerned itself almost exclusively with the expansion and modernisation of existing ordnance factories, and the setting up of additional establishments for the manufacture of high explosives. The entire capital expenditure of this programme works out at approximately Rs. 7 crores, and is being borne entirely by the British Government. It has been estimated that the Chatfield plan has led to an expansion of output in Government's own ordnance factories of between twenty and twenty-five per cent, by reason of the addition of plant which enables them to manufacture a wider range of arms and ammunition. Soon after the outbreak of war further additions were made to the original scheme in order to facilitate the production of small arms ammunition. The Committee's principal recommenda-

tions had been carried out by the end of 1941, and were in full production by then, whilst certain items are expected to come into production during the present year 1942. Typical of the Chatfield recommendations was the installation of three new shell-forging presses at an Indian ordnance factory as the first stage of a wide shell-forging expansion programme, which enabled the production of finished cavity forgings for several types of high explosive shell in India, including 25-pdr., 3.7" anti-aircraft and 3.7" howitzer. I mention this not very startling fact, because I want to emphasise that the Chatfield enquiry was exclusively directed towards gearing up production in the comparatively small number of existing official ordnance factories which are maintained by the Government of India at all times, both in peace and in war. It represented the first and most obvious step towards the complete mobilisation of India's munition-making capacity. For, if Government's own establishments, to which it looked for the irreducible minimum of its munitions requirements, were not, in fact, yielding the maximum output of which they were capable there was very little sense in exploring other means of production, which was the main task of the next investigation in the list I quoted above, namely, the British Ministry of Supply, or Roger Mission, which visited India in the autumn of 1940.

Munitions production, as distinct from the provision of the longer catalogue of miscellaneous articles required by the Defence Services, turns largely upon the development and the capacity of the engineering industry in any country. Foolishly or otherwise, rightly or wrongly, the engineering industry in India has hitherto been organised on a jobbing basis, and has existed principally to maintain other industries,

and not for production in the accepted sense. The failure to recognise this elementary fact has given rise to much heart-burning, a great deal of useless and uninformed speculation and not a little recrimination. Probably, as a result of the war, the Indian engineering industry will have altered its character, and will be engaged to a very much larger extent on production proper; but the fact is that at the beginning of hostilities its potentialities were limited in the sense described above. This was the crux of the situation which confronted the Roger Mission when it came to consider how best the production of munitions in India might be accomplished. But first of all, a word about the Mission itself. In the phraseology of an official document issued at the time, the Mission was "the fruit of consideration given by the Ministry of Supply, the India Office, the Government of India and the War Office to the question of the most effective steps that could be taken to expand the production in India of munitions and the other stores required by the forces." The Mission, which arrived in India in the autumn of 1940, was charged with the general object of enabling India not only to meet her own needs for her defence, but to make an even greater contribution to the general war effort of the Empire, and in particular to enable her to equip and supply the forces in the Middle East and East of Suez. The Mission, which remained in being until the early summer of 1941, was instructed to keep His Majesty's Government in close touch with Indian problems and requirements, and to advise both them and the Government of India as to the most useful action to take in order to assist India in increasing her output. Sir Alexander Roger's colleagues consisted of six other members of the Mission, composed mainly of business executives, who in turn were assisted by

fourteen technical experts, some chosen from such places as Woolwich Arsenal. Sir Alexander himself is the head of a number of well-known industrial concerns, and had been Chairman of the Tank Production Board at the British Ministry of Supply. They were a well-balanced and selected team, chosen for their expert capacity to judge the practicability of establishing new production units in India, or the desirability of enlarging existing concerns. Upon these two main propositions hung a number of lesser ones. The problem of supplying the necessities of production—certain types of machine tools for example—in which India was deficit had to be studied. These are necessary for the manufacture of a long list of the implements of war. What articles of equipment could best be produced in India, what she had best import, what share of the available supplies from foreign countries, and of the exchange necessary to purchase them (for Lease/Lend had not then emerged from the crysalis stage) could be allotted to her? All these and many other things comprised the formidable enquiry which the Mission undertook with expedition and vigour. Except at intervals and to prepare and present its report, the Mission rarely functioned as a whole; from the beginning it was realised that if it was to survey the whole of Indian industry in anything like a reasonable period of time, it would have to work in groups chosen for their knowledge and experience of the main heads of industrial production. And this procedure was followed with success, for it was in fact the only possible way in which so complex an investigation could be carried out inside the few short months that the Mission was in India. By the early summer of 1941, its work had been completed, a report prepared and presented to Government, and the Members had re-

turned to their ordinary jobs in business or administration with the knowledge that their labours, and the advice which they had tendered to both the British and Indian Governments, would result in an expansion and more rational integration of production as between India and the other countries of the Commonwealth. Their recommendations were not made public and, quite understandably, there are those in India who feel a sense of grievance over this, particularly as official reticence has often been assumed to reinforce the charge that the Roger Mission had the preservation of British post-war export trade in mind when framing its recommendations, which incidentally involved the expenditure in India by His Majesty's Government on new factories and plant of no less than Rs. 12,34,91 lakhs, a figure which takes only capital account into consideration, and is no measure of the recurring expenditure or the increased prosperity thus brought to India in the form of wages and other payments. I do not propose to fan the embers of a controversy that is happily dying away. But I think that when the full facts can be told, it will be seen that there were irresistible arguments on grounds of national security, against making public the recommendations of the Roger Mission. The fact that the information thus disclosed could not at that time have been confined to India, and that we are now at war with Japan, is ample justification for the action which was taken, and in my view outweighs the risk of misunderstanding between Government and the public.

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Whilst the Roger Mission was in India the Eastern Group Conference, which authorised the setting up of a permanent Eastern Group Supply Council, was

held. The event was unique in the history of the Empire, which at that time was searching for a closer alignment of its economic resources; for Russia was still outside the struggle, and President Roosevelt was only able to carry the American people by short and uneven steps towards a policy of aid for the Allies. Individual Commonwealth countries had each of them stepped up the tempo of their war production, and increased the range of goods produced. But hitherto there had been little attempt to co-ordinate production and distribution to the best advantage. Such a process was clearly desirable in the interests of sound strategy, and it was obvious that India, placed as she is athwart the main highway to the East and the Antipodes, was the ideal venue for this important gathering of the Commonwealth clans. There was the further fact that the Conference would be able to take advantage of the presence of the Roger Mission in the country to reinforce its deliberations. Accordingly, there met in Delhi in October 1940 representatives of the Government of India, the Commonwealth of Australia, New Zealand, the Union of South Africa, Southern Rhodesia, Burma, Malaya, Hong Kong, Ceylon, Palestine and the East African territories represented in the East African Governor's Conference. The object of the Conference was to make the countries of the Eastern Group as far as possible self-supporting for war supply purposes. With the evolution of a joint policy as a result of the Conference, it was hoped these countries would work together as a single block for the production of war materials.

Such a policy involved co-ordination on a large scale of their existing and potential productive capacity. This is necessary if wasteful competition and duplication under economic conditions are to be

avoided.

For example, if all these countries concentrated on the manufacture of khaki drill, the war effort in the Eastern hemisphere was likely to be diverted into channels of over-production of one material to the exclusion or under-production of other items equally vital. Under a sound economy a country produces an article for which it enjoys maximum advantages in respect of location, supplies of raw materials, manufacturing capacity, skilled labour and quick and cheap transport.

How complex and vast this problem is can be judged from the fact that for the maintenance of armed forces as many as 40,000 kinds of different articles are required. In the first year of the Council's existence India supplied 60% of the total demands placed on the Council. Since the fall of Hong Kong, Malaya etc. she has been supplying 75%.

Other Empire countries in the Eastern hemisphere were doubtless manufacturing an equally large number of such articles. It was, therefore, highly probable that by the autumn of 1940 there was already some duplication. Some of the participating countries, if assured of large orders, would be able to produce articles which were neither manufactured in the other participating countries nor obtainable by them from abroad. A joint policy of planned and co-ordinated production alone could clearly overcome such difficulties.

The resources of the participating countries were refreshingly large. They possess a large manufacturing capacity in iron and steel, textiles, leather manufactures and harness, wool products, food-stuffs, rubber, etc. India and the Dominions have always accounted for a considerable degree of the self-suffi-

ciency of the British Empire as a whole.

The object of this Conference was not a general economic discussion, but the settlement of a joint war supply policy for the Eastern Group, under which the maximum use could be made of the existing and potential capacity for war supply of each participating country. It was hoped that the policy settled would make the countries of the Eastern Group as far as possible self-supporting in the matter of war supply, the deficiencies of one participant being made good from the available or potential resources of others. The deliberations of the Conference were limited to war supply problems, including the essential needs of the civil population of any participating country where they constitute a war supply problem. Obviously it was impossible for the Conference to range over the entire commercial and economic field, for the object in view was to settle quickly the measures necessary to co-ordinate the war effort.

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Such were the circumstances in which the Conference met, and such were the principal considerations which influenced its deliberations. These latter, which continued for several weeks, need not be recapitulated here. From the beginning it was hoped that the Conference might result in the establishment of a standing committee representative of the participating countries, whose duty it would be to see that the decisions of the Conference were carried out. And this, in fact, was what the Conference decided upon. The creation of the Eastern Group Supply Council was its major decision. The loss of Malaya, Burma and the Netherlands East Indies, U.S.-Australian co-operation in the defence of the Commonwealth against Japan and

the dislocation of certain trade routes between India and other countries in the initial stages of the war in the East have served to rob Eastern Group Supply practice of some of its early strategic significance. But, because it played such an important part in the initial development of India's own Supply policy I propose to examine its working in some little detail.

The Eastern Group Supply Council took formal shape in February 1941, under the Chairmanship of Sir Archibald Bonham Carter, the British Government's senior representative on the Council—a Home Civil servant whose work had previously brought him into the closest touch with Indian affairs. As the problems which confronted the Council were almost entirely administrative, it was perhaps natural that it should be largely composed of professional administrators, of whose ability to handle questions of production and distribution business men are invariably distrustful. It would be as well if we remembered that the Council has never been called upon to concern itself with production, except as an indenting body. From the beginning, and up to the time of writing this book, India's representation has been in the hands of Mr. M. S. A. Hydari, a member of the Indian Civil Service, whose care for his country's interest in the Council Chamber has done much to dispel the idea, so sedulously fostered in some sections of the newspaper press, that India attends the proceedings as the poor orphan child, whilst Dominions come there in the role of the wicked uncles.

Indian suspicion of the Council, happily now a good deal less manifest than at the beginning, was based to a large extent on that lack of information which has given rise to misunderstanding in many matters concerning the war. For instance, it was

feared that the Council would be the means of concentrating the development of heavy industries in the White Dominions, leaving India as the supplier of cotton textiles and raw materials. This fear has been largely dissipated by such publicity as it has been possible to undertake without giving away information useful to the enemy. Confidence in the Council's purposes was also undoubtedly created by the fact that an Indian was appointed to represent India, and that it is through him that the Council receives its information on questions of Indian industrial capacity and allied matters. Criticism has, therefore, recently tended rather to take the line that, if India had been encouraged before the outbreak of the war to build up her heavy industries still further, she could have made an even bigger contribution to victory. Some disappointment has also been voiced at the Eastern Group Council not taking upon itself the task of encouraging new production. In point of fact, it was the erroneous idea that the Council would encourage new production which gave rise to the original suspicion in India that one of its aims would be the concentration of the heavy industries in the White Dominions. That suspicion having been considerably modified, regret that the Council should not be in a position to encourage production has taken its place. The permutations and combinations of criticism are innumerable, and an attempt to refute them here would be a sheer waste of time.

* * * *

How does the Council work? Perhaps we can best glimpse the process by harking back to the procedure that was followed before its establishment. Then the indenting authority, whether His Majesty's

Government or Mid-East or the Far East, would place their demand on the country which they thought could best implement it. As often as not, such a demand was placed on India, and if she could not produce the article at all, or not in sufficient quantities, or not up to the required specifications, there followed a hunt round other Empire countries. This resulted in waste of valuable time, and led to conditions of supply which can fairly be described as living from hand to mouth.

All this changed with the establishment of the Council, to which the Central Provision Office, is an essential adjunct. What happened was this. On its establishment in February 1941, India submitted for the Council's examination the demands on her for the many thousands of articles which were included in the term war supplies, which were then outstanding. She indicated at the same time the extent of her capacity in respect of each, and asked the Council for instructions as to the allocation of these demands. India in common with the three Dominions, Australia, New Zealand and South Africa, has as indicated above, her own representative on the Council, which consists of these four representatives together with the U. K. representative, who is the Chairman of the Council, and a military member, who is Controller General of Army Provision. In the matter of allocation, therefore, India, through her representative has an equal voice with the Dominions. In allocating these demands the main considerations which influence the Council are ease and speed of supply, with price entering into consideration but subordinated to these two all-important factors. Owing to her central geographical position in relation to the theatres of war outside Great Britain, India has always held a position of dominating advantage; and the result has been that a great part of the continu-

ing demands for many thousands of articles of war supply have, in fact, been allocated to India. My information is that there is not a single article of supply for which India has the capacity, orders for which have not been placed on her. In regard to those items for which India does not possess the capacity, or only insufficient capacity, the usefulness of the Council at once becomes apparent. For it is possible, with the other Group countries represented on the Council, to allocate these deficiencies to one or more of them, and report such as the Group are not able to supply to His Majesty's Government. When I use the word 'capacity' I mean capacity for producing a given quantity by a certain fixed date. Almost all the demands on the Council are for fulfilment by a certain fixed date.

In the allocation of these demands for the future, how has India fared? Has she suffered in any way by the establishment of the Council? Have the suspicions which some sections of Indian industrialists and Indian politicians harboured against the Eastern Group Conference, and the Eastern Group Supply Council, been justified by the Council's activities in the eighteen months of its existence? The answer is emphatically no. In the first place there is India's geographical position. In time of war an army will go, as a rule, for its supplies to the nearest market. Neither Palestine, East Africa nor Egypt on the one side, nor Malaya or Burma (both now out of the picture) on the other, have been able to produce the range or the volume of articles which India can. These countries have been drawn upon for supplies, but their production of articles which India can produce is, comparatively speaking, so small that it does not greatly affect the quantum of the demand on India. On the other

hand, over a limited range they can produce articles which India does not, and in most cases cannot produce.

Coming to the position of India *vis-à-vis* the larger Group countries, which are Australia, South Africa and New Zealand, the same proposition holds good—more or less. From the beginning it was clear that the production of the Group countries, including India, was in most cases complementary and not competitive. Where, as in the case of Australia, South Africa and India, each country has a large munitions producing organisation, domestic demands are big enough to absorb, and more than absorb, total production. Any exploitable surplus is a deliberate rather than a fortuitous creation, and the demand for munitions is so great as to eliminate any question of competition between the main Group countries. The word 'complementary' needs a little explanation. For example, Australia is sending woollen yarn to India, so that her woollen mills can be used to capacity for the purposes of the war effort. India is sending cloth to Australia and South Africa so that they can make them into military garments for the manufacture of which India has, compared to them, only a limited capacity which is fully taken up. This is only one instance; there are many such.

Much of the earlier suspicion of the Council's motives is disappearing. It is being gradually realised that following its activities new production is resulting. There is a continuous search for new capacity made the more necessary by the course of the war in the Pacific in the last ten months. When a demand comes into the Council, for which there is no obvious source of supply each Group country through its representative is asked what his country

can do. Frequently it has happened that the demands of the Council have resulted in a country either finding new capacity within its territories, of which it was previously unaware, or of undertaking, after weighing the prospects of the industry continuing after the war, the establishment of new manufacture. India, perhaps more than any other Group country, has been benefited by this drive and is likely to benefit still further in the future. For, compared to the other Group countries, her resources are enormous. Her chief weaknesses are two—an insufficient supply of skilled labour and of machines. Both of these disabilities have to some extent been relieved by a series of special measures.

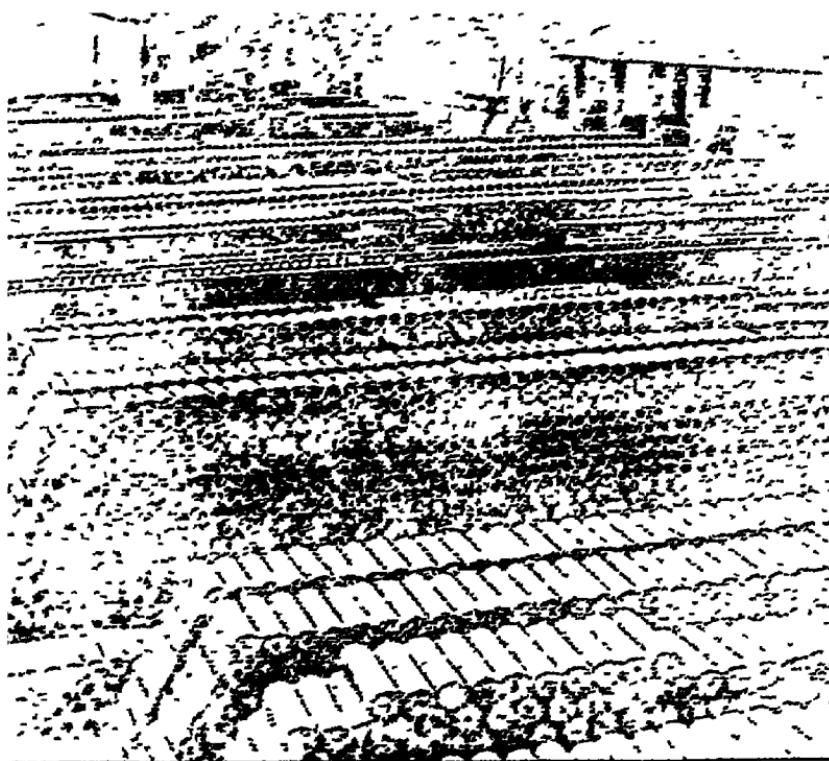
The Council is enabling India to plan her war production by means of demands spread over a reasonably long period of time. It is giving her opportunities of new production which she can take up if she considers them worth while. She is also obtaining a more complete idea than she had before of the productive range of other Group countries. But India is not the only beneficiary. The other countries in the Group are obtaining the same advantages from the Council's operations. The Council has become a powerful instrument for the common good of the Group, and thoughts are already turning to the future when collaboration, which was initiated for purposes of War, may be continued in Peace. At the moment of writing it is difficult to assess the effect of the loss of Hong Kong, Malaya, the Netherlands East Indies and Burma upon Eastern Group Supply as a whole. Some manufacturing capacity, and a very considerable source of important raw materials, have been lost, temporarily at least, to the United Nations. It is probable that the vanished manufacturing

capacity can be fairly easily replaced within the remaining Group countries; the loss of essential raw materials is a more serious matter, however, and will take longer to adjust. As the fighting in the Pacific war zone grows more intense, the demands upon the reduced total resources of the Eastern Group Supply Council are likely to grow rather than diminish. At the same time increasing enemy pressure on eastern sea-routes is likely to throw India, Australia and South Africa still further back on their own resources. Thus, both at Home and abroad the demands on Indian manufacturing capacity are certain to grow during the remainder of 1942 and 1943. For the present the situation is a little confused by Allied reverses in the East, and though we know what ground has been lost on the economic front, and what can be replaced or regained, there are certain other factors which are the imponderables in the situation. Such an one is China, whose greater need for Supply in the wide sense, unhappily synchronises with a severe curtailment of her communications with the outside world. India is the remaining link between China and her Allies, and it is clear that it is to India that China will look for increasing succour.

Amidst a war situation in the East that has not yet resolved itself in our favour, there is, however, one certainty, and it will have a substantial, probably decisive, effect upon the struggle in the Pacific. I refer to the vast resources and manufacturing potential of the United States of America.

* * * *

As I write Colonel Louis Johnston, former Assistant Secretary of State for War has visited India as President Roosevelt's personal representative. A



IN A GUN AND SHELL FACTORY IN INDIA
is manufactured at a Metal and Steel Factory ready for
converting into shells. M. 27/40

technical mission from the United States headed by the Honourable Henry Grady, former Assistant Secretary of State, who is assisted by three of the country's leading industrialists has completed its work, the precise nature of which cannot be defined with that degree of exactness which certain suspicious sections of public opinion would prefer. Until the summer of 1941 when the effect of the Lease/Lend legislation in the United States began to be felt in India, contacts between India and the United States had remained more or less normal. America was buying mica, manganese, and other raw materials from India as well as jute goods while India was purchasing from America motor vehicle chassis, machine tools, and other things required for the war effort, in addition to a large range of ordinary merchandise, the flow of which was naturally conditioned by the dollar exchange position. With the establishment of the Indian Purchasing Mission in the United States, and the entry of the United States into the war the position changed¹. India has had to state a very detailed case for Lease/Lend facilities, and after a study of all the facts presented to them by Sir Shanmukham Chetty, the American Administration suggested that India might benefit considerably by the visit of a technical mission from America. This suggestion was welcomed by the Government of India, and it is hoped that the Mission may be able to fill some of the gaps in India's munitions production. The detailed recommendations which the Mission has made as the result of its enquiries are just as likely to be withheld from the general public as those of the Roger Mission—

¹ The total orders placed on Lease/Lend up to Mid-May, 1942, including steel, are valued at about \$45,000,000 (Rs. 14 85 crores).

and for the same overriding strategic reason². To some extent mystery must surround its conclusions, and that mystery will be particularly irritating to a public opinion which is very properly concerned that India's industrial future should not in any way be mortgaged. It is hardly likely that either the Government of India, or the Government of the United States, contemplate any such thing; and if they are now observing a strict reticence as to the final recommendations of the Mission it is only because far-reaching strategic issues depend upon their discretion.

India has been a beneficiary under Lease/Lend for sometime past, and there is no doubt that what she has so received has helped to complete various departments of her own war effort. As thought on the subject of Lease/Lend is still confused in many quarters, I may perhaps be permitted to conclude this chapter with a brief reference to how it has worked in the case of India.

There is a widespread misconception that India has as much *right* to obtain goods from the United States under Lease/Lend as any other country. The fact is that no country—except the United States of America herself—has any rights under Lease/Lend. The United States Government is the sole and final arbiter of each individual application for assistance, and the criterion she has hitherto laid down in the case of this country is whether the acceptance of a particular indent would increase India's ability to fight, or what is equally important, increase her capacity to supply others who are fighting. In administering Lease/Lend the United States in effect says, "We are not producing to order, but you can have those things we

² See Appendix II.

have got which may happen to fit into your own organisation, or you can have the nearest thing to it that will be helpful." Bulk indents are the essence of the transaction, and in each case they have to be supported by specific government justification. But the problem is not merely one of production. It is also a matter of getting the stuff out of America and into India, which has up to now been largely conditioned by a shortage of freight, though India may expect to benefit indirectly by the enormous programme for the construction of new tonnage, which is now in progress in the United States of America.

Lease/Lend is about the only department of Indian Supply into which the Secretary of State for India projects himself. He handles certain indents for military stores under Lease/Lend because there is a good deal of standardisation of many things which are used by all the armies of the Empire, and which are common to British, Indian and Dominion fighting forces. In such circumstances his contacts with British and Dominion purchasing authorities—contacts which are closer than could possibly be obtained in India itself—make for a simplification of procedure which must be to the advantage of all concerned. There is a certain amount of centralisation in respect of other kinds of war stores, details of which cannot be included in this bird's-eye view of a highly technical and complicated subject. To attempt to lay down rigid formula is only likely to be misleading, for Lease/Lend is really nothing more than a convenient title for a very comprehensive measure which envisages almost any kind of transaction. Already Lease/Lend is taking on rather a different complexion than was the case when America was still technically a non-belligerent, and by the end of the war it may have developed into something quite

different from heretofore. But already one can perceive the emergence of certain basic procedure. For instance Lease/Lend is, and can only be, a matter between governments. Even if the Government of the United States wished to deliver articles under Lease/Lend to a private person, or even a corporation, it could not do so without infringing its own laws. Supplies are made against funds in the shape of definite and limited appropriations by Congress, from which articles can be procured by the American Administration for distribution to approved Governments. It is by no means a question of "ask and ye shall receive," but quite possibly of competing and conflicting demands. Whatever the Administration may ultimately decide, Lease/Lend is not eternal, nor yet legalised even for the duration of the war. It has a relatively short-dated and limited life, and must expire on June 30th 1943 unless extended by Congress.

Statistics are not available but it is a reasonable assumption that the demands on Lease/Lend have been far more than the U. S. authorities could possibly satisfy particularly since America began to look to her own vast rearmament programme. In the circumstances a very severe preliminary sifting process has been established in indenting countries. In India the broad principles upon which the Supply Department have assessed each application for assistance under Lease/Lend, before passing it on to Britain or the United States, are roughly as follows :—

Can this material be obtained within India, or from an Empire source or the sterling area?

If the answer is yes, then it should not come up for consideration under Lease/Lend.

Is it an article to be used in or for warfare?

Or an article which is so essential that if it is not obtained, India's ability to prosecute the war on the military or the economic fronts will suffer?

If the answer to this is no, then the matter should not be pursued on a Lease/Lend basis.

When individual applications have passed either or both of these tests, departmental policy is framed, keeping in view the fact that orders must avoid unnecessary repetition or fragmentation. They must, therefore, be regularly placed; they must look as far ahead as possible; and they must above all be fully justified and specific. To attempt to deal with the multifarious details of the subject of Lease/Lend, which lie behind these general principles, would involve the reader in a long and tiresome journey over ground that is entirely *terra nova* to most people, and so I will not make the attempt. Clearly, also, there are good reasons why I should not give involved and detailed figures. But it can be said that though Lease/Lend was designed primarily to help Britain, India too has benefited to an extent that will surprise most people when it is possible to give particulars of all the transactions that have passed between this country and the United States of America. How far Lease/Lend, as we have known it up to now, may ultimately be modified as a result of the continuing investigations of the United States Technical Mission to India, it is quite impossible to forecast. What can be put on record, however, is that substantial as India's material gains may have been, Lease/Lend has been no less valuable as a warm-hearted gesture from a country whose good opinion the people of India particularly value.

CHAPTER IV

STEEL TOWN—I

Tatas is to India what Broken Hill Proprietaries is to Australia. India's varying industrial fortunes are epitomised in the romance, the struggles and the ultimate triumph of the House of Tata. There are others; and looking back on the encomiums of the preceding sentence, I hope I shall not be accused of underestimating their importance. For the facts are on my side. More than any other indigenous or competitive organisation, the great Tata concern has been the repository of the hopes and fears of the Indian investor, and dozens of other Indian types who, though neither investors nor speculators, nor industrialists nor scientists, none the less believe instinctively, and passionately, that their country has an industrial destiny to fulfil. Martins of Calcutta is an outstanding example of Indo-British co-operation, to whose growth under the guidance of a Bengali of rare genius a British writer is only too happy to pay homage. But, if Martins is to-day a pattern of what many of us hope may be the form industrial co-operation will take in the future, the Tata Iron and Steel Company is essentially a monument to indigenous enterprise. It is true its policy has been to seek the best technical assistance wherever it was to be found—Britain, the United States and Germany have all provided departmental experts—but fundamentally it was pledged to carry out a process of speedy Indiranisation from bottom to top, and has accomplished

it at a quicker rate than most observers believed was possible. Both tariff protection and Indianisation have been amply justified by results; for Tatas is one of the Empire's assets in this war. In spite of varied interests which extend over a wide field of industry, and include such differing activities as aviation and heavy chemicals, the word Tatas stands pre-eminently for steel in the public mind, and it is to this, the most important branch of their business, that this chapter is devoted.

In India, as in America, Steel has to some extent been synonymous with Politics. Again, in keeping with precedent, steel shares have been the chief gambling counters of the stock exchanges of Bombay and Calcutta, where the prices of Tata Steels and Indian Irons (the latter linked to the Steel Corporation of Bengal and, part of the Martin-Burn group referred to above) are the weather-cocks of two of the most excitable share markets in the world. The circumstance cannot always have been to the liking of Tatas, particularly in the early days, and one of the heaviest burdens of the founders of a company, which was simultaneously seeking state aid and to establish itself in public confidence, were the great waves of speculation which, from time to time, broke over their enterprise and tended to obscure the real goal to which their energies were directed. The speculative tradition still persists, because steel shares, in any free market anywhere in the world, offer the more adventurous entrepreneur quicker and wider fluctuations than any other kind of scrip. But in the case of Tatas it can no longer harm the Company or its prospects, for solid achievement tells its own tale and needs no endorsement by the bull or the bear of the market place. As I write Tata Steels Deferred Ordinaries, which possess a face value of Rs. 30/- stand at Rs. 1,160/-. The latter figure seems almost fantastic, but it is not unrelated to facts, as

any stockbroker will tell you. Between the figure of Rs. 30/-, at which the deferred ordinary shares stood when the Company commenced production in 1912, and the Rs. 1,610/- at which they were quoted when these words were being written, lies the long road which two generations of Indian steel-makers were to tread before they reached the stability and comparative prosperity of the present day. This is not the place to recount the setbacks and the triumphs of their journey, which have, in any case, been fully described by a number of other writers. I am concerned with the place of Indian steel in the economics of warfare, and to those who complain that I am slow in getting to the point I would plead for patience, because some knowledge of background is indispensable to a necessarily cursory examination of a very complex subject.

* * * * *

Up to 1912 India was dependent upon imports from abroad for practically all her steel requirements. The United Kingdom, the Continent and, to a lesser extent, the United States of America shared in the trade. The statistics of twenty or thirty years ago have little relevance to the present position. More recently, and of more importance, is the fact that imports of iron and steel of all kinds into India (including Burma) reached their peak in 1927-28 at 1,450,000 tons. A little less than a decade later, in 1936-37, they had fallen to only 400,000 tons, before the separation of Burma from India. Under the various measures of tariff protection, which the Indian industry enjoyed from 1924, not all kinds of steel were protected. Imports of protected steel stood at 915,000 tons in 1927-28, but had fallen to 217,000 tons in 1936-37. These figures include Burma. In 1938-39 imports into India alone amounted to no more than 162,000 tons.

As imports fell Indian production rose from 429,000 tons in 1927-28 to 935,000 tons in 1938-39, a total which has since been enhanced. Such figures tell their own tale. India's dependence upon extraneous sources for her steel requirements is now a thing of the past, and it is unlikely that British or Continental manufacturers will recapture a market which is estimated at approximately one million tons per annum. The country mainly consumes sheets, bars, rails, structural sections, plates, tin-plates, hoops, tubes, wires, bars and rods. Closely allied to steel production is pig iron, of which India is one of the world's chief exporters. For basic steel, and for certain types of foundry work, Indian pig iron enjoys a high reputation abroad—particularly in Japan, the United Kingdom and the United States. In 1929-30 pig iron exports from India totalled 569,000 tons, but had declined to 218,000 tons in 1932-33, the year of the nadir of the depression. Later they revived, and touched 629,000 tons in 1937-38, to drop to 514,000 tons in 1938-39.

The statistics which I have abstracted and presented above are dry, but necessary, reading, if we are to get the picture into proper focus. For they make it clear that, if the indigenous steel industry is only just about able to meet India's normal civilian consumption, the diversion of a large part of its production to war purposes involves a considerable measure of official control of its ordinary commercial use which is, in fact, the case. It also follows, that, within that large part of the total output which is earmarked for armaments, there can be no reckless generosity in allotting quotas for projects which are frankly experimental, and unlikely to constitute a serious contribution to the war effort for long periods of time. This point is not sufficiently appreciated by those who criticise Government for failing to encourage this or that

enterprise, which they (the critics) think would assist the cause of victory. The necessity of making the best possible use of every ton of steel that emerges from Indian works is obvious prudence, though not necessarily a decisive argument why official support should *not* be given to this or that scheme. Taken in conjunction with other circumstances, one imagines that it has been a contributory reason in a number of cases where the authorities have reluctantly had to say no to a proposal which, superficially, would appear to be the essence of common sense and patriotism.

In spite of the fact that the Tata Iron and Steel Company is the largest single steel producing unit in the British Empire, the great British concerns now consisting of mergers of various plants, a glance at the tables on the adjoining page will show that the Indian industry contributes only a very small part of the total world output. India's production is vital to her own war requirements, but assuming that she produced a little over one million tons of steel ingots in 1940, the figure is still dwarfed when placed in juxtaposition with those I cite in the accompanying tables.

WORLD PRODUCTION OF STEEL—1937-40

The world production of steel ingots and castings during the last 4 years was as follows:—

Steel Ingots and Castings¹

(In thousands of net tons)

		1940	1939	1938	1937
United States ..	..	65,250*	52,798	31,752	56,637
Germany ⁵ ..	..	28,150	29,617*	25,621	21,881
Luxembourg ..	..	1,450	2,016	1,584	2,767
Belgium ..	..	2,500	3,429	2,519	4,265
France ⁶ ..	..	6,100	9,407	6,806	8,731
U. S. S. R. ..	..	21,800*	20,719	20,335	19,649
United Kingdom ..	..	15,000	15,119*	11,641	14,520
Canada ..	..	2,000	1,509	1,263	1,513
Italy ..	..	2,800	3,005*	2,560	2,301
Japan ⁸ ..	..	7,100	7,055*	6,459	6,406
Sweden ..	..	980	1,231	1,079	1,219
Spain ..	..	565	560	519	185
All Other Countries ⁴ ..		4,100	3,860	3,580	4,180
TOTAL ..		157,795*	150,325	115,718	144,256

Estimated. ¹ includes charcoal, iron and ferroalloys. ² includes Alsace-Lorraine. ³ includes Korea and Manchukuo. ⁴ India, Australia and South Africa account for a good portion of the totals. ⁵ includes Saar and Austria; and Czechoslovakia and Poland since 1939. * Highest yearly production.

(The Iron Age, January 2, 1941-61)

India produced 1,250,000 tons of steel in 1941.

The productive capacity of the Axis and the Anti-Axis Powers is given below:—

Axis and Anti-Axis Steel Front
(In thousands of net tons)

<i>Axis Powers</i>	TONS	<i>Anti-Axis Powers</i>	TONS
Italy	2,800	United States	65,250
Spain	565	U. S. S. R.	21,800
Japan	7,100	United Kingdom	15,000
Germany	28,150	Canada	2,000
Luxembourg	1,450	Empire Countries	4,000
Belgium	2,500		
France	6,100		
	48,665		108,050

Assuming that a considerable part, or possibly the whole of Russian production might be lost to the Democratic front, any gain to the Axis will be more than offset by increased American production which at October 15th, 1941 amounted to 82,000,000 tons per annum, according to a calculation made by the American Iron and Steel Institute. This figure has undoubtedly been enhanced since the United States of America entered the war as a full belligerent.

* * * * *

The last war served to emphasise the growing importance of the Indian Steel industry as a factor in strategy. On the occasion of a visit to Jamshedpur in 1919 the late Lord Chelmsford, a former Viceroy of India, said: "I can hardly imagine what we should have done during the past four years if the Tata Company had not been able to give us steel rails which have been provided not only for Mesopotamia, but for Egypt, Palestine and

East Africa." History, as we know, repeats itself; and I venture to assert that, by the time we come to the end of the present struggle, the Indian steel industry will have earned an even warmer tribute than the somewhat pedestrian proconsular vote of thanks which it received twenty-one years ago. In this war the scope and the extent of the assistance which it has been able to give to the Allied cause are infinitely greater, for the industry is no longer in its infancy, and has long since passed the stage when its future could be regarded as a matter of some uncertainty. The great technical advance since the last war is the making of armour plate in India. As was the case twenty-one years ago, Tata rails are still carrying troops and munitions to the front line, but to-day armour plate and armour piercing steel made in India serve our soldiers and sailors in the very battle itself. This simple statement may seem trite, to some even unimportant; but when we recollect that there are countries which have been producing steel for many more years than India, but which are not yet manufacturing armour plate, we realise how very considerable is the achievement of those who have been quietly working in our own midst so that, if necessary, India might take her place amongst the armaments-makers of the world. I take off my hat to what Australia has achieved in the same field, and I raise it even higher when I contemplate her deficiency in certain types of alloys; but as a sober matter of fact India has done even better. The manufacture of armour plate, or armour piercing steel, is not easy of accomplishment. In peacetime individual countries do not exchange information on the subject, and armament firms are no more communicative to one another than their respective governments. I believe that even under the dire stress of war there are certain reticences which the layman finds difficult to justify,

and I imagine that readers will share my own opinion that such a policy is wholly indefensible. But the fact remains that India only produced armour plating and armour piercing steel after much tribulation. The General Staff at first asked for a good substitute for armour plate, so sceptical were they of the ability of this country to produce the real stuff. But Tatas went one better than the official indent. They replied with armour plating that has stood up to the most stringent official tests, which cannot be said of all the armour plating that has been tried by the military authorities in this country. Molybdenum is more generally used than tungsten in Indian armour plate, for limited supplies of the latter are urgently required for the manufacture of machine tools of which a wide range are now being made in India. The present ability to make armour plate, and the hard steels necessary for machine tools, is in no small measure due to Tatas research department. Thus, not all of Tatas technical and marketing research has been dedicated to increasing the commercial use of steel, though obviously, as a matter of wartime policy, both they and the Steel Corporation of Bengal, with whom they have a marketing agreement, are more likely to favour the re-roller of steel who is making something of proved use to India and displacing imports, than the bazaar merchant who is merely concerned with pushing up the sale price of a commodity that now has a pronounced scarcity value. The latest department of this great steel works to come into production is the tyre, wheel and axle plant, which means that in another somewhat specialised field of steel production India will not only be self-sufficient, but still further able to assist in providing those transportation facilities for the Caucasus and Central Asia which are necessary if we are successfully to counter Hitler's eastward thrust. Armour plate, armour piercing steel,

steel for machine tools and wheels and axles are key items in a long list of things that derive from Tatas, and which are of sovereign importance for victory. Whether on balance it be a tragedy or a blessing, not the least of the consequences of war is the all-round quickening of the processes of research, invention and production. In India, as elsewhere, the steel-maker is in the van of new enterprise; for upon his ability to keep at least one step in advance of them depend the fortunes of a number of other industries directly linked to steel on the one hand, and the general war effort on the other. Some of them I found had grown up around Tata, and of these I write in later pages. Meanwhile, let me record a few impressions of the Colossus itself.

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One of the major defaults of my Indian career may be measured by the fact that when I set out to visit Tatas I asked the railway booking-clerk for a ticket to Jamshedpur. Six hours later, armed with the authority to travel to Tatanagar, I arrived at the long, gaunt railway station which is built to the depressing official pattern of hundreds of others throughout India. It was an early October night, just warm and sticky enough to furnish a hint of what the climate of Tatanagar would be like in the months of May or June. Tatas pay big wages and generous salaries. They have to. For, though Tatanagar is situated on the gentle slopes of the Chota Nagpur plateau, it is no pleasure resort, though the health services which the steel works have provided have improved it out of all knowledge in the last twenty years. In this respect the Company has the responsibilities of a municipality without the latter's power to tax and raise revenue. Jukselai, which lies between the railway station and the Company's property, is a sort of no-man's-land standing

between Tatas and the rest of the world. In the eyes of the Tata official Jukselai is the abomination of desolation, but to the visitor it serves to emphasise the vast difference between the inconsequential growth of an insanitary bazaar and the planned, social development of a great modern industrial establishment. If typhoid, small-pox or plague break out in Jamshedpur it can almost always be traced to Jukselai; so can the thief, the mendicant and the disturber of the peace.

Some figures are necessary to reinforce my description. Jamshedpur has an area of about 25 square miles with a population approaching the 200,000 mark. It claims the highest percentage of literacy in India—40% for males and 60% for children of school-going age. 1,067 miles from Bombay and 156 miles from Calcutta, this thriving industrial centre is situated close to its raw materials, and at the same time lies within easy reach of a great seaport. The Tata works occupy an area of approximately two and a half miles, and the steel company owns valuable iron ore concessions in the Mayurbhanj State in Orissa, the Kohlan Government Estate in the Singhbhum District and Keonjhar State in Orissa. It possesses manganese ore deposits in Keonjhar and Bonai States, limestone in Gangpur State and Sakti State as well as in the Bilaspur and Jubbulpore districts of the Central Provinces. It also extracts dolomite from Gangpur and possesses collieries in Bengal, Bihar and the Korea State in the Central Provinces, whilst it obtains magnesite and chromite from Mysore State. This catalogue is of importance in this narrative because it serves to describe some of the places and the industries which, in their turn, are benefiting from the twenty-four hour working day which the war has imposed upon the steel works. For Tatas are working "flat out," as the saying is, on war orders, upon the prompt and efficient execu-

tion of which may well depend some of the most decisive operations of the war.

One steel works is very much like another; and to the layman the finer points of difference, which would probably capture the attention of the scientist, are completely invisible. Nevertheless, I spent two whole days on the Tata plant, and a third visiting the subsidiary industries of Jamshedpur. In each case, time only permitted a most cursory examination and explanation of processes which, though vividly real and intelligible at the moment they were given, are quite inexplicable as I view them in retrospect. Nor, indeed, would the reader benefit by a clumsy attempt to describe them. But certain impressions stand out indelibly in my mind. The colourful glow of the Dupleix plant, which throws its beacon-light into the heavens all through the night, came to symbolise for me the whole spirit of this great enterprise which is working for the Allied cause. As I saw red streams of molten steel issuing from its cauldrons I knew them, not only for what they meant in terms of guns and tanks and cars and ships; but, in a way that I had never experienced before, I saw India's war effort directly linked to the great battles that are raging on land and sea as I write this book. Often, in the past two years, I have been worried by a sense of unreality as I tried to fit into the pattern of victory some of the things which we in India are doing for the war. Two days on the Tata plant banished the thought for ever. For, as I surveyed the busy scene in one long bay after another, I realised that here in India men were, in fact, doing the same job, turning out the same skilled work, and forging the same weapons of victory as their brethren in Sheffield or Chicago or Brisbane or Corby. And, if the world did not know it, I vowed that so far as my own feeble voice was able to proclaim the good news it

would do so.

There is a tremendous sense of urgency about the daily round at Tatas to-day, and it is not all just because there are departmental and production bonuses in addition to the profit-sharing bonus, in which all workers participate along with shareholders. For the last two years this bonus has amounted to twenty-five per cent of the annual wage, and I believe it to be the case that, if an employee takes full advantage of all the special opportunities that are found within the compass of the profit-sharing and production bonus schemes, he can earn as much as seventeen months standard pay for twelve months work. High pressure production demands high pressure work, and it will be seen that such terms offer very material inducements to every man, from the senior executive down to the humblest cooly, to put forth his best endeavours. And so it is. But one also found that, quite apart from the question of remuneration, there is a real appreciation of the fact that without Indian steel India's war effort, at least in the economic sphere, would be very considerably curtailed. The cry is for steel and yet more steel. For obvious reasons I am precluded from printing progressive production figures but I am able to state that the ever-increasing demand for steel is being successfully met by the Tata Iron and Steel Company and the Steel Corporation of Bengal, and that output is now keyed to the highest possible pitch. The maintenance of this demands something more than the mere gratification of the profit motive. A clue to what that particular *something* is can be found in the circumstance that a very considerable portion of the additional earnings of the labour force at Tatas finds its way back into the war effort, as an investment in Defence Bonds and Certificates. A distinguished British economist said a few weeks ago:

"We know now—in a way we did not know perhaps when the war started—that it is wrong to think of war in terms of money. We know that the things that count in fighting are labour, plant, materials, and organisation, and that finance is only a way, a means by which we arrange these real things to the best advantage for the war effort. It is a servant, not a master, an instrument." If his prescription is true, and the longer we go on the more obvious it becomes that in the last resort it is labour, plant and materials that will count, then the Tata Iron and Steel Company is assured of most honourable mention in the scroll of victory.

CHAPTER V

STEEL TOWN—II

In the last chapter I have endeavoured to provide the reader with the rough background, and to indicate the place which the steel industry occupies in India's peace and war economy. It is now necessary to particularise a little, and however much one may try to avoid the reproduction of a mere catalogue of output, such lists must occasionally find a place in this book, if it is to be even an approximately faithful record of the wartime achievements of Indian industry. At the risk, therefore, of boring the reader I must set down in some little detail the many things which the Tata Steel Company are now specially producing for various branches of armament manufacture.

The foresight displayed by the Company in constructing its new Control and Research Laboratories two or three years before the outbreak of the War, placed it in a position in which it could render immediate and substantial help to Government. To-day, as a result of elaborate researches conducted by its staff, it is able to manufacture and supply, in addition to large quantities of structural products and carbon steel, a wide variety of new types of special steels such as bullet-proof armour plates varying in thickness from 4 m/m to 14 m/m for the fabrication of armoured fighting vehicles; bullet-proof rivet bars for the manufacture of rivets for use on these vehicles; a special austenitic steel for the electrodes employed in the welding of Tatas' armour

plate; a special alloy steel for the manufacture of shear blades, required for the purpose of shearing armour plates; high-speed steel for machine tools; bullet-proof plates for Howitzer shields and gun turrets on armoured fighting vehicles; 40 m/m and 60 m/m thick proof plates of special alloy steel composition for the proofing of armour piercing shot, composite plates to withstand the attack of a 2-poundershot, and chrome-molybdenum alloy steel bars for the manufacture of the shot; nickel-chrome steel rounds for the production of 18-pounder and 25-pounder armour piercing shells; high carbon steel for the manufacture of Mint dies, for high explosive shells for various calibre guns, and for rolling into sheets for ordnance requirements; nickel steel plates for gun carriage mountings; special deep drawing quality steel for cartridge cases and for rifle and machine-gun magazines; a special high-alloy nickel-manganese, non-magnetic, steel developed at the request of Government for use in the manufacture of service helmets; stainless steels for surgical instruments; steel rounds for the manufacture of hammers for 106E fuses; special quality Basset type trawler bed plates of cast iron for the Director of Shipbuilding; plates of varying thickness for Admiralty floating docks; special steel sheets for the manufacture of food containers for the fighting units; 2½" diameter rounds of high sulphur steel for the manufacture of nose containers for H. E. aircraft bombs; "S" 20 lbs., mark III/A special quality alloy steel bars for the manufacture of magnets for the Government Post and Telegraph Department; and nickel-chromium-molybdenum steel bar sections for the manufacture of parachute harness equipment.

Amongst the other steels regularly produced and supplied against Government orders may be mentioned structural steels, such as sections, bars, plates, black

and galvanised sheets and piling bars for supply to the Middle East; carbon and alloy spring steel bars; rails of all sections including light rails for Decauville tracks; steel billets for drawing into telegraph wires and into barbed wire for military defence purposes; and Admiralty "D" steel for ship-building. The Company's output of ordinary steels which is being used directly or indirectly for war purposes by Government amounts to over 800,000 tons per annum.

The Company has also developed a successful welding technique for the electric and gas welding of chrome-molybdenum steel required in the manufacture of aircraft, and has been conducting experiments so as to discover the possibilities of the manufacture of high silicon steel sheets for motors and transformers etc., required by electrical industries. It has also developed a process for the manufacture of acid open hearth steel from indigenous raw materials, and is now proceeding with the construction of a steel-melting shop for the purpose. A large quantity of this steel will be utilised for the manufacture of railway wheels, tyres and axles in the special plant which was brought into operation in November 1941, and to which reference was made in the preceding chapter.

* * *

But as I indicated earlier, whilst Tatas are the hub of Steel Town, there are other companies whose role is of scarcely less importance, since it is they who convert the solid slabs of metal into specialised products of various sizes and shapes.

Of the several auxiliary industries that have grown up round the great Tata concern, the story of none is more interesting than that of Indian Wire Products Ltd., which was founded 19 years ago. The first four years of its career were a period of chequered failure,

until in 1927 the chief interest in the Company was acquired by the veteran Sardar Bahadur Indra Singh, one of the most romantic figures in a town which is replete with romance. The Sardar Bahadur's story is one that is worthy of its own chronicler, and I will not attempt to tell it, but from the moment he assumed control of Indian Wire Products its fortunes changed, till to-day it is a large and prosperous concern, engaged one hundred per cent on war work, and filling an exceedingly important niche in the scheme of things. Three thousand workpeople are making rods, nails, barbed wire, galvanised wire, telegraph wire—in fact wire of every description—bolts, nuts, rivets and nails for British forces all over the Eastern theatres of war. Before the outbreak of hostilities a number of Germans were employed as supervisors, foremen etc., at Indian Wire Products, but these have been replaced mainly by Belgians. The Company's wages bill is one lakh of rupees per month, and I doubt if any private enterprise anywhere has so thoroughly concentrated the whole of its resources on war production and to the exclusion of everything else. Incidentally, it is worth noting that before the war the Company encountered its chief competition from Japan, from which country wire and nails were able to make their way into India at rates which were strongly suggestive of "dumping."

Another smaller enterprise which owes its inception to the clear vision of Sardar Bahadur Indra Singh is a company known as Jemco. Employing a thousand men, Jemco is engaged in making the rolls necessary for the manufacture of steel, and which India formerly used to import from the United States, Germany or Belgium. Jemco is the only indigenous manufacturer of these articles, which are indispensable to the steel industry. Production was begun before the war, and

the Tata concern itself, re-rolling mills in all parts of the country and the Mints in Calcutta and Bombay, to mention a few of the miscellaneous users of rolls, are to-day dependent upon Jemco for their requirements. This little company has done a war job of outstanding importance for India.

An offshoot of Tatas, which has more than justified its existence in giving service of a highly specialised nature, is the Company's subsidiary known as Agrico Ltd. Agrico is really a super-blacksmith's shop and it is equipped for the large-scale manufacture of edge tools, such as hoes, pick axes, railway track tools and felling axes. Since the war the demand for these and such things as meat choppers, chisels, crow and clawed bars and hammers has increased enormously. In consequence Agrico has been running three shifts, and is working almost exclusively against official orders, at prices which are generally considered moderate when one takes into account the increased cost of imported stores. One would have thought that manufacture of hand tools for military purposes, of not very elaborate design, was essentially the kind of job at which the small Indian craftsman, so adept as a rule in the management of a hand forge, would excel. But the fact is that experience has shown that this particular type of article is from the military point of view a better product when manufactured by the larger unit. As a result the demand upon Agrico tends to grow rather than diminish, and of course from the point of view of the Army, who are the chief users of these implements, it is a good deal more convenient dealing with the bulk output of one agency than the production of hundreds of scattered craftsmen.

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Little known to the general public, but of enormous

INDIAN RAILWAY WORKSHOPS PRODUCE MUNITIONS

More photos showing how railway workshops in India are contributing to the national war effort.

O. P. S. The Manufacture of 4.5" H. E. shells calls for a sequence of very precise operations, the spigotting operation on the rough machined shell gripped in a M. 245/41

importance to the war economy as a whole, is a steady supply of tin plates and sheets. In consequence the Tin Plate Company of India Ltd., an independent concern which is situated at Golmuri near Jamshedpur, is of special importance. I think I am correct in saying that it is one of only two such works in the Eastern Group, the other being Lysaghts Works at Newcastle, New South Wales. The Tin Plate Company of India thus occupies a unique position in the war economy of India, and her nearest neighbours in the Commonwealth. In the factory three thousand men are employed on a process which continues uninterruptedly for six days and nights each week, turning out what is probably a bigger tonnage of tinplates than is manufactured in any works of comparable size in any other country. Mass production methods are employed, but although the total tonnage is so large and the work so intensive, frequent rest periods ensure that no man is overworked. The working day for all is eight hours, but in the Hot Mills, for example, where the red hot steel is rendered down into thin sheets, the mill men share the work in relays so that the actual working time for each is no more than two or three hours out of the eight. Rates of wages are high, and over two lakhs of rupees are paid out every month giving an average wage of between Rs. 60 and 70 per head.

Tinplates are essential to all civilized communities, and in a country like India which largely relies on kerosene oil for its lighting, the kerosene tin is a vital necessity to most homes. Every year millions of tins issue from the oil installations situated at all the principal ports of India, and these tins find their way to every up-country station and thence to every bazaar throughout the countryside, to be emptied and used for innumerable subsidiary purposes, such as holding vegetable oils

and ghee, for carrying water, or for rice, dhall or salt, or to be cut up by the village tinsmith and made into lamps or other household requisites. In peacetime, nine-tenths of all the tinplate used in India goes to pack kerosene oil, vegetable oil and ghee, but tinplate is also used for making tins for tea, coffee, biscuits, butter, cigarettes, paint, lubricating oils, disinfectants and numerous other purposes.

In wartime the uses of tinplate, however, are still further expanded, to make mess tins, ration tins, water-bottles, ghee tins, camp kettles, fuse caps, degchis, frying pans, pudding bowls, butter tins—scores of articles essential for the Army's equipment. None of the above are manufactured at the Tinplate Company's Factory itself, which confines its work to making and sending out the flat sheets of tinplate to the factories where the finished articles are made.

Tinplates, as a rule, take weeks to manufacture from the time the necessary steel is procured from the steel works, rolled into thin sheets, cleaned, annealed, cleaned again and coated with a thin film of molten tin. At Golmuri the factory, however, is peculiarly adapted for quick production, and with the Tata Works at hand to supply the necessary steel, tinplates can be produced to order probably quicker than at any other works in the world.

Thus, very sketchily, I have tried to draw a picture of the steel town that has grown up round the Tata works. The limitations of space, and of my pen, have done less than justice to one of the busiest spots in the world. Great industrial centres in Europe and America seem somehow to merge gradually into the country around them, and the sheds and the smoke and the grime gradually tail off into another kind of civilisation. If you fly over Tatanagar you are struck with a different

kind of picture—not artificial, but one which emphasises the determination of India to industrialise herself at all costs. As you look down upon the alternating miles of undulating pastoral land and jungle, so typical of rural India, and you see that Tatanagar has been torn out of the very heart of this by what appears to have been short, swift operations, you realise that this decision to industrialise was a quick, impulsive and significant gesture to the rest of the world. Nowhere else in the sub-continent does one see the old India and the new in such vivid juxtaposition.

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By way of a postscript to this chapter, I must include a brief reference to a concern which is geographically remote from Steel Town, but which fabricates a considerable proportion of the output of the Tin Plate Company of India into the finished articles required for the fighting services and for civil defence. I refer to the Metal Box Company of India Ltd., which was not inaptly described to me by a Supply Department chief as one of the principal production “bottle-neck breakers.” The Metal Box Company of India has world-wide affiliations, for there are twenty-three sister companies in the United Kingdom, three in South Africa and one each in Canada and Australia. It is also associated with the Continental Can Company of America, whose technical advice and assistance has been of the greatest value during the period of the war. Its world-wide connections have made possible many new developments by the pooling of technical knowledge so that India, in addition to gaining experience herself, draws on the experience of others. In this particular field of manufacture “press capacity” was the thing that originally had to be mobilised, and

the Company has in turn placed its technical knowledge at the disposal of about a dozen small indigenous tin box-makers and press metal factories, whose productive capacity has been turned over to making metal webbing and equipment. Assistance has been freely given for purposes of manufacture and operation, and the production of webbing equipment has literally run into hundreds of millions of units by now.

Here again, as so often in the course of this story, one has to record that as much as fifty per cent of the machinery employed has been made in India itself, and but for the ingenuity and adaptive capacity of the Company's engineers output must necessarily have been much lower. At the two factories situated respectively in Eastern and Western India, the Company's pre-war labour force totalled twelve hundred men. To-day it has been enlarged to more than three thousand, amongst whom I noticed a preponderance of what seemed to me very young men, but I was assured no one below the age of eighteen was employed on the plant. There is a special wartime training scheme for line supervisors and foremen. In spite of the large increase in the total labour force, the Company's European staff has been considerably depleted by calls for military service, and although executive posts have been filled by Indians none have been found for the senior engineering staff, which has been strengthened by the addition of Czech technicians. Of the Company's output 60% is now directly linked to munitions production, and the balance serves essential civilian trade. More than 80 articles of ammunition and warlike stores are made at the Company's factories, and the following is a summary of production figures up to September, 1942: 400,000 antigas ointment tubes; 350,000 anti-tank mines, Mk. V.; 500,000 ammunition

case linings ; 750,000 baking tins ; 44,000,000 brass eyelets for webbing equipment ; 140,000,000 clothing buttons ; 2,750,000 million containers for dust goggles ; 4,000,000 emergency ration tins ; 700,000 fuse safety caps ; 850,000 gas warning signs ; 100,000 Hawkins hand grenade No. 75 ; 570,000 holder detector gas sprays ; 50,000 insecticide sprayers ; 1,750,000 mess tins ; 400,000 respirator anti-dimming containers ; 6,000,000 snap fasteners for webbing equipment ; 150,000 tail units for Bomb M.L. 3, 10-lb ; and 24,000,000 nineteen different components for webbing equipment *i.e.*, buckles, tips, brass hooks, etc.

A job of which the Company is rightly proud is the manufacture of Breda machine-gun feeders. The Breda is an Italian machine-gun, and during one of the earlier phases of the war in North Africa a very large number of these guns were captured—minus their feeders. A print suggesting the design of the feeder was sent by air from Libya to India, and the Metal Box Company was ultimately asked if it could undertake manufacture. With very little to work on, it produced a specimen which was flown back to the front and found to contain minor defects. The military authorities then decided to send a Breda machine-gun by air to India, and it was duly delivered at the Company's plant from which, in a very short time, there emerged several hundred feeders which, after delivery to the Middle East, were fitted to the captured guns and the latter subsequently used against their original Italian owners. Of greater significance for the war effort generally, however, are recent measures which have been taken to economise in the use of tin. As a result of events elsewhere India is, at the time I write, living on her stocks of tin, though some is coming forward from Britain and the U.S.A. There is

thus the most urgent necessity to conserve tin supplies in every possible way. To this end black sheet, which is simply steel sheet protected against rust by coatings and special lacquer, is substituted wherever possible for tin plate. And the extent to which such substitution has been found to be possible is quite amazing. A composite container is also on the way to mass production in India, thanks to research by the Company's associates abroad. It consists of spirally bound cardboard, glued and waxed, and saves eighty per cent of metal per container. Ultimately plant will be installed capable of turning out seven million containers per annum, which seems to me a high enough target figure for anybody.

CHAPTER VI

KUMARDHUBI TO CONSTANTINOPLE

There is, however, another steel town. I have not been able in the course of this survey to visit the Bhadravati Works in Mysore, but readers will recall that earlier on I made a reference to the Steel Corporation of Bengal which, with the older Indian Iron and Steel Company, from which it derives, is a second great centre of supply of the basic raw material of the armament industry. No account of India's place of importance on the economic front would be complete without some attempt to describe in more detail the growth of this other industrial giant, which is situated north-east of Calcutta, from which it is distant about one hundred and fifty miles on the main railway line to Bombay. Burnpur, where this second great steel plant is located, and Tatanagar lie due north and south of one another separated by approximately a hundred miles of country. But there is no direct communication by rail, and though geographically they are so close to each other, there are sharp contrasts between the two places which at once catch the traveller's eye. For instance, their residential quarters dot the two places. From this point of view even the most casual observer has no difficulty in placing the predominant architectural note of Tatanagar as belonging to the second decade of the twentieth century, whereas Burnpur is Bungalow Town such as may be seen all over the south coast of England. The Indian Iron and Steel Company and the Steel Corporation of Bengal

have a close working arrangement as companies, and are subject to the control of the same managing agency, but they are distinct physical entities working under separate executive direction at Burnpur. Of the two, the Indian Iron and Steel Company is much the older creation; in fact though the Steel Corporation was planned and to a large extent built before the war, it was only after the outbreak of hostilities that it came into production. In its last report on the steel industry the Tariff Board suggested that India had reached a stage of economic development where she might definitely benefit from the existence of a second large steel producing company. Negotiations and planning towards this end began in 1937 under the aegis of the well-known Martin-Burn managing agency, who had for many years directed the affairs of the Indian Iron and Steel Company. 1938 and 1939 were fateful years for the peace of the world, and, as it became increasingly certain that war would break out sooner or later, the creation of the Steel Corporation of Bengal was pushed ahead with feverish energy. Some of the machinery for the new works at Burnpur was ordered from Germany, but the managing agents had taken the precaution of stipulating that it should be sent to India in British ships. And so it arrived safely. German technicians specially engaged for work on the furnaces and cogging mill were on the plant until a few days before the outbreak of war. Throughout the summer of 1939 the Company was very largely engaged in a race against time, which it won, but only by a short head. All over the world the steel industry was booming in preparation for the coming conflict. Not only was it difficult to obtain quick delivery of machinery, but it was by no means easy to get skilled labour and supervisory staff to come to India. Finally, however, all obstacles were overcome, and the Steel

Corporation of Bengal produced its first ingot in the second week of November 1939, which ingot now stands at the works' entrance as a shapely memorial to the occasion. Thus, the Second Great War found India with her second great steel works.

Not all the plant was working at first, and the Corporation only got into full production by May 1940, but the fact that it was producing within three years of the excavation of the foundations is, I believe, a world record. The plant was originally designed to have a capacity of 240,000 tons per annum, but at the time I write production is at the rate of 276,000 tons a year. I am told by the experts that the Steel Corporation is one of the best designed steel concerns there is, incorporating all the very latest ideas in lay-out and assembly; and although I went round it on an exceedingly hot April day I can testify that it was certainly the coolest of the many grilling industrial establishments that I have visited for the purpose of writing this book. But that is a minor point. What is of greater importance is that it has been so designed as to admit of rapid and substantial extension. Output can be economically stepped up, and a figure of half a million tons per annum is well within the bounds of possibility. Indeed, it is one of the management's present targets. For the benefit of those who prefer precise technical details to broad journalistic generalisations, I give the following summary of progress and production.

Excavations were first started on 29th May 1937. The first ingots were made in 'A' Furnace on the 11th November 1939. 'B' Furnace charged on 1st March 1940, 'C' Furnace on 20th May 1940. The first ingots were rolled on November 16th, 1939 in the 40" Blooming Mill. The 18" mill commenced to produce billets on November 21st, 1939, and the 34" section mill started on

December 11th of the same year. The first finished sheets were produced on 12th February, 1940, although sheet bars had been rolled into rough sheets some weeks previously. Galvanised sheets were first made on 27th May, 1940. Those were the beginning of the Company's operations. Below is a summary of production in 1941:

Gross Ingot Tonnage was	2,18,984
Less. Batts and Stripping Bay scrap	3,037
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	=14% of gross output
Net tonnage tollable steel made in 1941	2,15,947
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40" Mill during the year rolled giving an yield of 94 3%	2,04,440
34" Mills during the year rolled giving an yield of 93 1%	1,33,168
18" Mill during the year rolled giving an yield of 92 1%	54,844
Sheet Mill, during the year, finished giving an yield of 76 9%	74,926

As a layman I am hardly qualified to comment on these figures, but I believe a professional steel-maker would regard them with an affectionate and approving eye.

The arrangement between the Indian Iron and Steel Company and the Steel Corporation is simple but profitable to both Companies, whose destinies are linked together by an ingenious device. Indian Iron and Steel is the great supplier of raw materials and services—liquid iron, power, gas and water—to the Steel Corporation, in whose profits it participates as to a fixed percentage. Thus, from the beginning the Steel Corporation has been able to concentrate all its energies on the actual business of steel-making. This chapter must, I fear, do less than justice to the Indian Iron and Steel Company, without which it would not be possible



Sir Guthrie Russell K C I.E., Kt., B Sc., A.M. Inst. C.E. has been Director-General of Munitions Production since 1940. Prior to that he was Chief Commissioner for Railways in India for a period of eleven years, and during 1939-40 he was President of the War Transport Board. He is 55 years of age

to write with such satisfaction of the Steel Corporation itself. In addition to the several items enumerated above the Indian Iron and Steel Company have installed a toluene plant, and this is now being manufactured as a bye-product of the many other things which the Company makes for India-wide consumption. The Steel Corporation naturally employs a large labour force. Apprenticeship and training schemes are given special attention, for it is to the company's interest to build up as strong a tradition of technical knowledge and experience as possible against the years of development that lie ahead. So far as the general body of its labour is concerned the Steel Corporation pays wages and leave and sickness pay at approximately the same rate as Tatas, the only wide difference in the practice of the two concerns being that the Steel Corporation prefers to pay a production bonus rather than a profit-sharing bonus, and in the case of a comparatively new project this arrangement contains obvious advantages for the workman. A steel worker's job is to make steel, and he does not, as a rule, know what further transformation the latter will ultimately undergo. They pride themselves at Burnpur on the high quality of their steel, and at the time that I visited the works a large part of their output was earmarked for shells, picket posts, rails for the Middle East (where the appetite for Indian-made munitions and stores seems insatiable), bridge parts, telephone equipment, containers and water tanks for burying in the desert. A varied and useful indent.

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No other concern that I know of has so completely given itself over to war production as the Indian Standard Company Wagon Company, also situated in Burnpur, and like the Indian Iron and Steel Company and the

Steel Corporation of Bengal also under the management of the Martin-Burn organisation. As its name implies the Indian Standard Wagon Company is normally engaged in the manufacture and repair of railway rolling stock, a business which in normal times is largely dependent upon the goodwill of a small and powerful group of customers. In view of the acute shortage of wagons in India, it might be argued that the Company would be doing just as good a job of war work in making carriages and wagons, leaving to others the specialised production in which it is now engaged up to a hundred per cent of its capacity. Actually, of course, it is still manufacturing wagons—but they are almost all wagons for military purposes, and I was very interested to note that steel salvaged from Hong Kong, of which I was told there was a stock of twelve thousand tons, was being turned into bogie wagons for use in an adjacent theatre of war. I found every inch of space in the works taken up, and the amount of molten and red hot metal and boiling oil one encountered in this congested hive of industry constituted hazards enough for a short-sighted layman, who had to walk warily. The main output of the works consists of shell-forgings, drop-forgings and fittings for armoured vehicles, of which I saw a number finished and made, but waiting for chassis from the United States. I took a note of the work in hand on the day of my visit, and I think it worth mentioning in some detail, because in my opinion it is an exceedingly revealing catalogue. At that time the Indian Standard Wagon Company were engaged in finishing 78 Mark II Armoured lorries; they were in the middle of an order for 800 Mark Ic armoured carriers, with a possible extension of a further three or four hundred; 300 high sided bogies were under construction for the Middle East. They had a standing order for 23,000 3.7 shell-

forgings per month and 50,000 4.5 shell-forgings per month. Production on these was to go on indefinitely. Hinges and fittings were being made for all manufacturers of armoured cars—of whom there are a number in India. Nissen twin sheddings, or army huts, were being turned out in large numbers, whilst pick axes were being manufactured in lots of 15,000 and an order was being executed for 80,000 double-ended spanners. These orders had a book value of Rs 52 lakhs, and whilst I am not so much concerned with that, except in so far as it means increased prosperity for shareholders, executives and workmen, I would like to emphasise the speedy and efficient manner in which an essentially commercial concern has gone right over to munitions production—and in a big way too. Few laymen realise what is involved in a metamorphosis of this kind, or that it often means sweeping alterations in the character of the labour employed. The Indian Standard Wagon Company's peacetime staff knew all about wagon-making, but when they went over to war production a whole host of new processes had to be learnt and mastered. That this was done so expeditiously was merely one of the hundreds of tributes to the Indian craftsman that I have listened to during the last few months. And writing of labour, it was whilst I was in this district that I most frequently heard the demand voiced for a more effective control of skilled labour, which had naturally developed a tendency to move to the higher paid places. At a moment when people were being exhorted to leave the eastern side for less threatened parts of India, when certain factories were being exhorted to move to other parts of the country and permission was being withheld for new projects to be laid down in Bengal and Bihar, there were naturally many opportunities for skilled and semi-skilled labour to migrate, or if it remain-

ed to initiate something of a price war for undoubtedly valuable services. I am writing of a time when it was practically impossible to procure die-sinkers, who were almost as rare as tool steel, and as I saw it there was a very strong case for more realistic regulation of the movements of labour itself, no less than the prevention of its seduction by competing employers.

* * *

Over the border, lying just within the confines of the Province of Bihar, are the Kumardhubi group of works, a description of which, for the sake of convenience, I must incorporate in the story of this other steel town. The Kumardhubi Engineering Works are pioneers in bomb manufacture in this country, and it is upon the results of their researches and experience that bombs are now being made in other parts of India. I have found that heredity is a strong factor in the engineering profession, and as the general manager at Kumardhubi is a descendant of one of Britain's early iron masters, and himself had served in the Army and the Ministry of Munitions in the last war, the urge to make bombs was, I suppose, unbearable and ultimately irresistible.

It looks easy when I write it down like that; and in a country in which there is a substantial body of learning, experience and equipment to draw on I suppose the manufacture of bombs presents no difficulty to the trained engineer. But I cannot too often emphasise that none of these assets were present in the Indian situation, and, therefore, the task of making a relatively simple instrument of destruction like the bomb assumes entirely different proportions. In fact the Kumardhubi company had first of all to design and manufacture the machines to make the bombs. When I was a small boy

at school, a master who deservedly had a reputation for the thoroughness of his teaching, used to make his charges say aloud at the beginning of each day: "Until we know that we know nothing we do, in fact, know nothing." This little formula was designed to induce in each of us a proper sense of humility; and I imagine it was in a similar spirit of respectful enquiry that the engineers of the Kumardhubi Company began their researches into the subject of making bombs. To the reader in the United Kingdom or America it probably seems fantastic that a concern which was willing so to give its not inconsiderable resources to India's war effort should be left to flounder in the uncharted currents of trial and error. In Britain or the United States expert guidance and the appropriate machines would have been quickly forthcoming for the job. But I am writing of India, and as I so often stress in this book the shortage of trained personnel and precision machinery is acute. How difficult it has been to procure up-to-date plant may be guessed from the fact that the largest lathe in this particular works was derived from the last war, when it was employed in the torpedo factory at Lancaster. Eventually after much tribulation the Kumardhubi Company, rather surprised, found itself making bombs of the trench mortar and aerial varieties. Production began modestly in June 1941. At first the monthly output was only a few hundred three inch bombs. In ten months it had risen to 20,000 a month, and the target figure, which may well have been realised by the time these lines appear in print, is 30,000 per month. Already production of larger calibre bombs has begun and several hundred 250 lb. bombs are part of the monthly output whilst, when I visited the works, moulds for a new line of 500 lb. bombs were being made. Let us hope the

beneficent work will continue. This company has been torch-bearers in this branch of munitions manufacture in India, and as a result of their labours railway workshops and others are being similarly equipped, so that the all-India output of bombs is being rapidly stepped up. In the coming months the R. A. F., the U.S. Air Force and Marshal Chiang's armies will need all the bombs we can give them. But bombs are not the whole of the company's war work. Spring steel ingots are being made in sizable quantities, a process in which a number of other companies are engaged in Bengal and the Punjab, whilst a most important branch of its activities is the strengthening of the many bridges in the province of Bihar, so that they may be the more reliable from a military point of view, and in particular may be able to take twenty-four ton tanks with safety. At the same time the requirements of the civil consumer cannot be entirely neglected, and work on haulage machinery, winders, pumps etc., for the adjoining coalfield (the biggest in India) must be carried on. I made some enquiry into labour conditions and here, as elsewhere, the war has brought prosperity to the Indian workman in a way which no peacetime boom could possibly confer. Wages are high and overtime is plentiful; but it was notable that, though the company had been permitted to employ each man on a sixty-six hour week, they had found that anything in excess of sixty hours did not pay in terms of health and efficiency.

Adjoining the engineering works and typical of a number of other plants in the district is the Kumardhubi Fireclay and Silica Works, whose activities contribute directly to several branches of the war effort. Every steel furnace, every factory and every locomotive needs firebricks of some kind or another. So do the boilers of His Majesty's ships, which are now making increasing

use of Indian ports for docking and repair facilities. Similarly, the astonishing strides made by the Indian glass industry during the war has called for a greatly increased supply of better quality sillaminite bricks. At the neighbouring Reliance firebrick factory I found that acid-proof ware was being made for the manufacture of cordite and explosives, as well as synthetic insulating bricks. The supply of imported magnesite bricks has been replaced. For the benefit of those who do not know, I may mention that a firebrick takes four weeks to make, a silica brick eight weeks and a magnesite brick twelve weeks. With production running into thousands of each kind per month it will be seen that output has to be planned well ahead. We are sometimes apt to overlook the humble brick, which is the hand maiden of so many industrial processes.

* * *

I cannot close this chapter without a reference to a small, but exciting, establishment called the Eagle Rolling Mills. As rolling mills go, it is neither a large nor a showy place. But it has a history, and however chequered that may have been, it is exceedingly busy at the present moment. The Eagle Rolling Mills started life under Belgian management in French India—in Pondicherry to be exact. Thereafter, the management was taken over by a British firm in Madras, but was later transferred to a Calcutta firm. In order to enjoy the benefits of the tariff on imported steel, the works were moved from French India into British India, and are now located in the steel town which I have endeavoured to describe in these pages. Some of the original Pondicherry workmen came with them. They have retained their French citizenship, and there are big roll tongsmen owning to names such as Jean Baptiste, Antoine, Ray-

mond, Anton etc. Their job is hard and physically exacting. It was hot enough in all conscience as I watched them doing it, but I was told that in the monsoon it was even worse, and that the men frequently collapse from heat. Work on the first stand in the small mill, which makes half inch rounds is exceedingly severe, and the company has found that the most economical way to work the men is to give them eleven minutes on and twenty-two minutes off. Certainly as I stood in their midst at the end of an exhausting afternoon, I felt it was the nearest thing to hell that I might reasonably expect to encounter at this stage of my existence. But what interested me most about this particular concern was that I found that almost the whole of its output was earmarked for Turkey. Kumardhubi to Constantinople! Who dare say that Steel Town is not doing its bit?

CHAPTER VII

THE IRON ROAD

Transportation is one of the major problems of modern warfare; for upon this department of strategy depends the success of many others. Quite apart from the more obvious wartime usages of the transport system, such as the movement of troops, the whole effectiveness of Supply often turns upon the transport facilities available. Munitions, stores, accoutrements, and the thousand and one items of Supply required to fit an army for battle, are practically never made in the field. Nor, looking at the other end of the picture, are raw materials always available in juxtaposition to the machinery that is to turn them into the finished implements of war. Thus, transport enters into the business of Supply at every stage from the factory to the battlefield, and its role is often of considerably greater importance than is usually conceded by the layman. As a rough working formula it may be said that on balance the advantage in sea transport, with which we are not at present concerned, lies with the Allies (and this does not exclude the considerable, but remote, accretion of shipping to the enemy in consequence of Japan's entry into the war); whilst the complicated network of Continental railways has given the Axis powers inside lines of communication, from which they have derived certain very definite advantages in all their European campaigns. But India is not part of the European system. She stands midway between the Middle-Eastern and the Far Eastern

theaties of war and, though all transport problems have certain features in common, many of ours partake of a character which is not reproduced elsewhere in the world. Distances are very great, and in consequence loads are longer and the strain on rolling stock is greater. The Indian railway system is divided into two main branches, and the existence of broad and metre guage railways sets a limit to interchangeability. And so on—points of difference between our own and the railways of other countries might be multiplied. But it is not the purpose of this chapter to emphasise the special features, so much as the tasks and the achievements of the Indian railways in the war.

Before we can properly appraise the part which the railways of India are taking in the present struggle it is first necessary to adduce a few simple facts. There are in India approximately 40,000 miles of railways, which have been progressively laid down since the year 1853. The physical equipment of any railway system consists of two classes of assets, stationary equipment—stations, yards, signals, permanent way, bridges, tunnels, etc.—and mobile equipment—locomotives, coaching vehicles and goods wagons. The pre-war equipment of Indian Railways under the first head has been sufficient up to date to meet the pressure of wartime needs, although it has been necessary to improve the capacity of certain sections to the extent that existing assets are available for the purpose. Routine maintenance and renewals have been possible, and although enemy aerial attack or invasion might result in damage to permanent way, normal replacement so far has not presented any very great difficulty. When, however, we come to mobile equipment, more commonly termed “rolling stock”, we are up against a proposition of a different

INDIAN RAILWAY WORKSHOPS PRODUCE MUNITIONS

This photograph taken at a railway workshop "somewhere in India" shows how the country's railways are contributing to the war effort.

7 12" billet being forged under the 2-ton pneumatic hammer. M. 175/41

kind—not only from the point of view of replacement, but of replenishment as well. The rolling stock with which the Indian railways began to assume wartime responsibilities consisted of assets varying in age—some old stock approaching superannuation, new stock which may serve for many years, but the majority between these two extremes.

* * *

Normally, a certain number of locomotives, coaching vehicles and goods wagons have to be retired annually from service, and replaced by new stock. Any delay or failure in this process would bring about an effective decrease in the stock and, if stock condemned to be scrapped is continued in service, a decrease in efficiency must obviously result. The optimum capacity of any railway plant, therefore, depends on the promptness with which the minimum replacement programme is carried out. At a time like this, however, such a formula can hardly hold good. The abnormal conditions created by the war have given rise to many difficulties. The most important item under rolling stock is motive power equipment, the supply of which, except for limited quantities, has hitherto been obtained from abroad. Original coaching and goods stock and replacements are met to a considerable extent from domestic production, though some components, not obtainable in India, have to be imported. While the interruption of foreign supplies seriously affects the motive power equipment position, the situation with regard to other rolling stock does not occasion the same degree of anxiety. The locomotive stock on our class I railways on 31st March, 1940, compared to 1930 (excluding the Burma Railways, for proper comparison) may be seen from the following statement:

Tractive Power available for use (In Million lbs)

Total Traction Power
(In Million lbs.)

B. G.	{	Steam	138 6	136 5	-2 1	110 6	112 2	+1 6
	Electric		71 4	2 1	+0 7	0 8	1 7	+0 9
M. G.	{	Steam	34 4	38 5	+4 1	27 8	33 3	+5 5
	Electric	"		.				
Total	.		174 4	177 1	+2 7	139 2	147 2	+8 0

There has, thus, been over a period of ten years a net decrease of 601 locomotives. The actual decrease on the Broad Gauge, which was partly offset by the increase in the number of electric and Metre Gauge locomotives, is even greater, namely, 659. But in explanation of this it must be remembered that the policy pursued since the last war, of replacing the old locomotives with locomotives of larger tractive power, was bound to lead to a reduction in number. It is, therefore, not so much the number as the tractive power of the locomotives that is important. The figures reproduced above indicate that the position in the aggregate, as regards total tractive power, apparently discloses little to cause anxiety, but it is noteworthy that the increase on the Metre Gauge of 3.7 million *lbs.* of tractive power masks a reduction of over 2 million *lbs.* of tractive power on the Broad Gauge railways, which constitute the main lines of the country. Not all this stock, it should be added is available for use, for reasons which will be made clear later in this chapter. Quite apart from the special war tasks to which they have been assigned, a certain number of the engines remaining for ordinary domestic use are always under repair in the workshops or sheds, and they are not available for operation. Approximately one out of every six locomotives in service is withdrawn from the line for this reason. The tractive power evaluated in the light of this fact would amount to 112.2 million *lbs.* on the Broad Gauge, and 30.5 million *lbs.* on the Metre Gauge, representing an increase in the last ten years of 7.4 million *lbs.* These figures indicate that the motive power equipment in 1939-40 had improved by comparison with 1929-30, and in normal times this would be regarded as a relatively satisfactory state of affairs. But these are not normal times.

It must not, however, be supposed that because of

the war India's railways are being treated as a gigantic but wasting asset, which can be drawn upon *ad lib.* Replacement may not be all that the Railway Board or the legislature would wish, and because it is limited by the difficulties of obtaining and importing components from abroad, it may not be entirely adequate to the present strenuous situation in which the railways find themselves. But it is going on; and absolutely, though not perhaps relatively, replacements of certain kinds of rolling stock are on a larger scale than would have been the case in peacetime.

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There are certain simple and obvious facts which have governed official policy. The first of these is that the railways could not be permitted to run themselves to a standstill—to go on doing a heavier and heavier job of work until motive power has disappeared, and rolling stock has worn itself out. Such a disregard of the elementary prudence with which man works both beasts and machines would have been ultimately disastrous to the Indian war effort, and profligacy of a kind which posterity would have found very hard to understand. Clearly, railway policy has to be directed to obtaining the best possible results on the assumption that only those repairs and replacements which are absolutely unavoidable can be carried out. Naturally, running under the heavy strain which is now imposed upon the Indian railways both repairs and replacements tend to increase at a rate well above the normal, and constantly to present new and urgent problems to the administration. So that the first task, one might almost say the supreme task, of the railway system is to keep itself in tolerably good running order—and in reality this is even more important than carrying out the many specialised engineering projects through which India is making a very real

contribution to victory, and which I shall deal with in some detail later on. The rolling stock programme for 1942-43 which was placed before the Standing Finance Committee for Railways provides for a total expenditure of Rs. 492.90 lakhs, of which Rs. 117.72 lakhs* is under capital account and Rs. 375.18 lakhs is under depreciation. An expenditure of Rs. 443.85 lakhs is contemplated for replacement of the existing stocks of locomotives, carriages and wagons which have already been broken up and have not yet been replaced. The balance of Rs. 49.05 is to be spent upon additional stock. The proportions in which funds are allotted to locomotives, coaching stock, wagons, tank wagons and so on need not trouble us, but these figures are eloquent of a future in which, when peace comes, the railways will have to embark upon an extensive programme of overhaul and reconstruction. Meantime, special means are being employed to ease the strain. Unnecessary travel is being discouraged; speeds have been reduced to retard the process of wear and tear; a Transportation Co-ordinating authority is at work, though even before its creation in February last the railways were themselves in effect observing a system of priorities; non-essential activities of all kinds are being eliminated. The system is likely to deteriorate as a whole, which is inevitable in war, and quite obviously worth it in attaining victory. Transport is a subject which concerns not only the Central Government but every provincial administration as well, for road and inland transport, which though it may compete with the railways is also complementary to them, is under the control of the provincial governments. Thus, the co-ordinating authority moves over a wide administrative field, not arrogating to itself the powers and func-

*Substantially reduced subsequently.

tions which belong to provincial governments, but seeking essentially to co-ordinate them and to ginger them up, thereby making available for the war effort the maximum amount of transport of all kinds.

Nor is the problem entirely one of gingering up; it may well involve a certain amount of reorganisation of a radical nature. As I write this chapter the Japanese advance westward is continuing on the borders of India, after the loss of Malaya and Burma. Sinkings have already taken place in the Bay of Bengal. Supposing Japanese naval and air power establishes itself still further afield, and the ports of Calcutta, Vizagapatam and Madras are brought still further into the battle zone? Their facilities for handling trade might well be impaired; and, indeed, the Bay of Bengal itself might be closed to all but heavily escorted shipping. This would result in a large overswing of traffic to the western side of India. The same process occurred at one period of the savage air attack on Britain during 1940, when trade was largely re-routed from the bombed east coast to the west coast. A similar diversion would create a fresh strain for the Indian railways system, which would call for extensive planning and co-ordination. Quite apart from such a contingency, which would only follow the actual physical impact of war, it is possible to envisage circumstances arising which are not so directly connected with the battle front, but which would call no less for bold planning on the part of provincial governments. Crop movements are one of the biggest items of traffic on the Indian railways, but under war conditions it is not possible to provide, even for food crops, all the facilities of peacetime. For example, cotton is grown in the Central Provinces as a cash crop, this province importing and not growing its food crops. It cannot be expected

that railway conditions will quickly right themselves, even when peace returns, and a long term policy might have to discourage food importations. I do not say that such a situation will arise quickly; or, indeed that it will arise at all. But we cannot entirely leave such a contingency out of our consideration of railway problems

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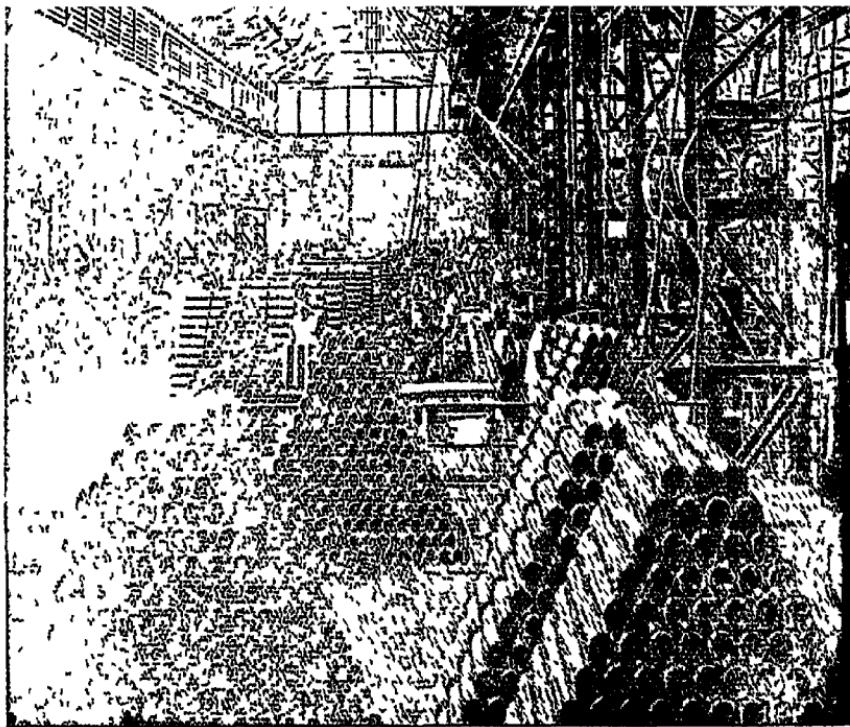
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So much for the disabilities under which the Indian railways are cheerfully and energetically carrying on. Let us now examine the positive side of their work. It goes almost without saying that the normal carrying business of the railways has been substantially increased as a result of the war. It is not possible to separate from the general increase those increases which are due to reduction in coastal shipping available, and other factors such as the requisitioning of road vehicles and petrol rationing. But a fair estimate is that the total traffic now being handled in India is about 25% greater than the year preceding the war. The latest figures available to me show that goods traffic is up by 30%, whilst passenger traffic has increased by 17%. When, however, we come to catalogue what I may call the special activities of the railways it is difficult to know where to begin. Readers will notice that a sentence or two ago I referred to traffic being handled in India itself. I did so deliberately, because I want to emphasise the exceedingly valuable job of work which the Indian railways are also doing outside India. Unfortunately those areas which at present constitute India's outer defences on the western side—Egypt, Libya, Iraq and Iran—are not well supplied with railway communications, though a great improvement has been effected since the beginning of the war, and for this India shares the credit with the United States

of America and other Empire countries. In a cinema a few months ago I well remember the audience giving a little gasp of surprise when a news-reel showed a string of railway wagons, bearing the familiar lettering M & SM, unloading cargo from a Dutch steamship in the port of Basia. It was, in fact a little cameo which for a split second epitomised the ubiquity of the Indian railway system in this year of grace and war. Because it was involved in hostilities from the beginning a good deal has been done to enlarge communications in the Middle East. India took a big hand in the good work, for which she provided both men and materials. In Iraq and Iran, which came within the orbit of military operations later on, railway lines are few and not well equipped. In bringing them up to the required standard India has played a major role.

In order to create railway transportation facilities it is necessary to have lines, rolling stock and trained personnel. Let us briefly examine how far India has helped to build the railways of the great bastions upon which her own defence and that of the Commonwealth, turns. Taking rails first, there are three main demands to be satisfied. The Middle East wants rails, but by now her requirements must be largely satisfied. Iraq and Iran want a constant and increasing supply, and last, but not least, India herself must have rails. I cannot give figures, but added together these three separate heads of demand constitute a formidable total. There is the further fact that modern war in the air compels the dispersal of railway lines at important military depots, involving the consumption of a much greater length of rail than would ordinarily be the case. The main sources of rails within India herself are:—spare stocks, by now exhausted; rails released by re-laying; rails by new rolling; and finally, by lifting and transferring existing railway lines. Re-



INDIAN RAILWAY WORKSHOPS PRODUCE MUNITIONS

Photos taken at a railway workshop in India showing how the plant has been adopted to munitions production.

Shell finish bored and ready for the bottling of the nose in a 250-ton hydraulic press.

M. 258/41

laying and new rolling is strictly regulated by the output of steel, which has to meet many other demands.

In carrying out their policy of dismantlement, which precedes the transference of old railway lines, the authorities have been at pains to cause as little dislocation as possible, and whilst public convenience cannot in this matter be the guiding principle it has been very much in the mind of the Railway Board. Over a period of months a considerable number of small lines have been dismantled, and the work is not yet at an end. Up to the end of last year (1941), however, the total mileage dismantled and sent abroad probably amounted to not more than 2% of the railway lines in India. Clearly nothing which would vitally affect the economic life of the country has been done, and it is highly improbable that some of the lines which have been chosen would in any case survive the advent of peace, which is likely to see some profound changes in the transport system, not the least of which is a considerable extension of motor services. Taking a target quantity, it is quite likely that by the end of the war India will have had to supply between five and six thousand miles of railway track, as well as several hundred bridge girder spans. By no means all of the first figure can come from dismantlement, to which it should be recorded with gratitude the Indian States have made a substantial contribution.

The demand for locomotives and rolling stock is mainly for Iraq and Iran, which run to metre gauge. Once again, the Indian States have been particularly helpful in a situation in which India was badly placed, even at the beginning of the war. The supply of wagons also presents a task which has fully taxed ingenuity and resources, but which has been carried out with characteristic determination. Once more we calculate in big figures. Hundreds of metre gauge locomotives are

wanted by the military authorities, and are being supplied; the demand for broad and metre gauge wagons runs into thousands. The work involves rather more than the mere selection and despatch of rolling stock. The workshops remaining to the railways are working day and night reconditioning and overhauling all stock going overseas, converting locomotives from coal to oil burning and dismantling a large proportion of broad and metre gauge wagons so that they may be packed flat and thus conserve shipping space. This latter operation, ingenious but simple in its conception, involves a good deal of detailed work, but in view of the saving in space is eminently worthwhile. However, engines and wagons do not just run themselves; nor is the job quite as simple as we used to think in our childhood days. Operation and control of railway transportation in any shape or form calls for a high degree of professional knowledge and skill. It was, therefore, necessary to put at the disposal of the commanders in the various theatres of war enumerated above a body of trained railway personnel who would be part of the military forces. Obviously, the chief source of training and supply was to be found on the Indian railways themselves which have already released thousands of officers and men, and are training thousands more for the same purpose. These figures take no account of considerable numbers who have also been released for special technical employment in the Supply and Defence Departments, and to railway workshops engaged exclusively on munitions production. The aggregate of this withdrawal of personnel for special purposes has involved individual railway administrations, with resources already limited and steadily increasing operational burdens, in an even greater strain; and those who are left to carry on the day-to-day administration are serving the cause of victory no less than those

who have been seconded to special posts of a quasi-military character.

Being amongst the largest industrial undertakings in India, if not the largest, it was natural that the bigger railways should possess commodious and well-equipped ancillary workshops. It was, perhaps, inevitable also that, when the extension of production of indigenous armaments and munitions should come under consideration, the authorities should cast covetous eyes on these workshops, some of which have been turned over to munitions manufacture from quite an early stage of the war. Complete workshops were handed over to the Supply Department, the first early in 1940, the second a year later and a third in October 1941. Kanchrapara on the Eastern Bengal Railway is now devoted to the manufacture of aircraft parts and munitions, Dohad on the B B & C I. to munitions only and Singbboom (East Indian Railway) for the manufacture of armoured fighting vehicles. In addition to this the old Patel loco workshops in Bombay have been taken over for the manufacture of motor bodies. Hand grenades, shell bodies and parts, and fuse components are a few of the items that are now pouring forth in vast quantities from railway workshops, whilst at other associated establishments, such as the North-Western Railway clothing factory at Lahore, hundreds of thousands of shirts for the army are being made.

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It has not been possible in the course of my peregrinations to visit every railway establishment, which by reason of its work is entitled to mention in a chronicle of this kind. I was able to spend a day on the plant at Singbboom, where the East Indian Railway workshop has been given over exclusively to the making of armoured cars of the Indian model, which is in no way

inferior to the British and American patterns. On the contrary many soldiers think it a good deal better. In any case hardly a month passes by without a new improvement being introduced. The machinery for the special work which Singbhook is now doing was originally collected from all parts of India and brought together in the workshop, which has more than doubled its output since it commenced operations. From its long bays now emerge several hundred cars a month, and the pioneer work which was done at Singbhook has proved of inestimable value to other shops since turned over to making armoured fighting vehicles. As a training centre also it has provided a steady flow of misfits and technicians for other workshops as they have come into production. To the layman the business of making an armoured fighting vehicle looks very much like a gigantic game of meccano. I followed the progress of a car from the time it was merely a collection of bolts and screws and loose pieces of plates, through one stage after another to its final emergence as a fighting vehicle complete with many gadgets, the existence of which is unsuspected by the general public. A breath-taking ride on the test track confirmed her as being finally ready for delivery to the Army for duty overseas, where prolonged experience of desert warfare has shown the advantage of the heavily tyred car over the tractor-driven vehicles in certain circumstances. Armoured fighting vehicles from Singbhook are playing a magnificent role in the swirling desert battles of manoeuvre and movement in North Africa no less than in the slower jungle fighting elsewhere.

At Khargpur, where I also spent a full day of sightseeing, plant had been adapted to munitions-making and had been supplemented by other machinery collected as far afield as China and Japan. As the Works Manager put it to me, some of it was "rather Heath Robinsonian,"

ARMoured FIGHTING VEHICLES FOR AN INDIAN
RAILWAY WORKSHOP

This armoured carrier has reached an advanced stage on the assembly line.
H. A. 421/41

but it was doing a twenty-four hour a day job, and in the results thousands of two pounder, eight pounder and twenty-five pounder shell cases were being turned out every month. Of course, not all of the many acres of Bengal-Nagpur Railway repair shops and sheds at Khargpur are engaged on making shell cases, fuze components and hand grenades, which comprise the bulk of the munitions output; but that part of the works which has been so adapted is a small armaments factory in itself. The rest of the plant is devoted to the execution of the railway's normal repair and constructional work, to which has been added the repair and overhaul of locomotives and rolling stock from other railways, which have given over certain work-shops wholly to the production of munitions. So far as I know the executive staff at Khargpur never had any special tuition in making shell cases and the other things which they are now producing, and it says a good deal for the adaptability of British and Indian workmanship that they were able to go into production with very little preliminary bother. The personnel was found by what is officially described as "up-grading" existing staff, training semi-skilled and unskilled labour to the task, and taking on additional unskilled labour and apprentices at the bottom. Looking through a detached technical account of the work, which was prepared for the information of interested engineers and not for the edification of the lay public, I extracted the following passage from a section dealing with the production of one kind of shell case. "There were three machines at this stage, and all operations were done on each machine. This was the key stage, and by it all other stages on the belt were sought to be balanced. At the commencement 12 to 13 shells were obtained per machine per shift of eight working hours. After a year the output had reached an average of 40 per machine,

equal to 10,000 shells per month for all three machines on three shifts. In order to economise plant, comparatively old machines were at first used, but they proved incapable of maintaining output and finish and, soon had to be substituted by more modern high power combination turret lathes. Considerable difficulty was experienced in this group of operations, but they were all overcome one by one."

The particular document from which I have quoted was not prepared as pabulum for itinerant journalists. Indeed, I do not suppose it was ever thought that even a few of its words would be brought to the notice of the general public. But the story tells itself, and that is why I have ventured to quote from this matter-of-fact works diary. The random passage which I have reproduced epitomises the hopes, the fears and the subsequent triumphs with which railway engineers, little known outside their own immediate circle, set about the job of mass production of munitions. Similar cases might be quoted from other railways which I had no opportunity to visit. It may be argued that improvisation of this kind merely demonstrates how unprepared we were for a total war. That is an entirely different issue, into which I cannot now digress. I close this chapter in the hope that I have written enough to show that the Indian Railway's contribution to the sum total of the victory which we know will be ours, is one of which the country may well be proud.

CHAPTER VIII

JUTE & AN EVEN GREATER WAR

'Gold on silt' is how a writer of another generation described Calcutta; and by the gold he presumably meant the great jute industry, with which the city's fortunes are so closely bound up. Calcutta and Dundee, with the latter a very poor second, are the world's two greatest jute manufacturing centres. They meet the larger part of the European and American demand, though there are a number of jute mills in the United States itself, Germany, Czecho-Slovakia, Russia, Spain and France. The important thing about the Indian jute industry, however, is that although it may only enjoy a partial monopoly of the manufacturing end of the industry, its monopoly of the raw material is complete and absolute. For the raw jute fibre, from which all the manufactured goods are made, is grown only in India in spite of attempts that have been made to cultivate it in Brazil, and by the Japanese in Formosa and the Italians in East Africa. From the beginning of the war controlled amounts of raw jute have been shipped to Spain, and during the last twelve months Russia has received sizable quantities of the Indian fibre as well as the American and Dundee mills. But from the moment the British blockade began to function Germany and Czecho-Slovakia, and since her collapse, France, have been cut off from supplies of raw material, and after the exhaustion of stock in hand and reserves (which Germany, at least, may be presumed to have

created in the near-war period) the position in this respect in enemy countries must have become serious. For jute is a strategic raw material. It is not as important as oil or steel, or perhaps leather, silk or cotton, but I should say it comes somewhere within that group of strategic raw materials the absence of which is, not so much decisive, as highly inconvenient to a nation at war. In spite of the oft-expressed apprehensions of the leaders of the industry, no one has yet produced a satisfactory substitute for jute in its own field, though jute manufactures have broken into some new ground in territory that formerly belonged exclusively to other textile industries.

It has been said that war—any war—is the friend of the jute industry, and as a generalisation the statement contains more than a grain of truth. The Crimean War and the American Civil War brought the industry prosperity and opportunities for expansion, while the World War of 1914-18 created an unprecedented boom. During these periods most of the world's markets were still open to the jute trade. In the Crimean War only the Russian market was lost, and this was much more than made up for by the demand for jute goods to replace flax, which could no longer be obtained from Russia. During the Civil War in the U. S. A. jute goods were used as a substitute for cotton, which was difficult to obtain because of the blockade of the Southern States by the Federal Fleet, while all the usual markets were open to the jute trade—even the American ones, if the risks of war were run. In the war of 1914-18 only the markets of Central Europe and Turkey were shut off and, except for the lack of adequate shipping facilities and control of exports to countries adjacent to Germany, the rest of the world was open to trade. The

present war has produced different conditions. Practically the whole of continental Europe is closed to trade with the rest of the world, and the curtailment of shipping facilities has been more drastic than even in 1914-18. In that war too, the more or less static conditions of trench warfare which prevailed in France from 1915 to 1918, involved an enormous consumption of sandbags. At the beginning of the present war it was thought that the use of previously constructed concrete defences, like the Maginot Line, would obviate the use of sandbags on such a large scale, though large quantities were utilised for air raid protection. After some months' experience it was, however, decided that sandbags were not sufficiently durable and brickwork began to be substituted for A. R. P. purposes, but recent developments have again brought the sandbag into favour in field warfare. Manchuria, China, Indo-China and Thailand were formerly amongst India's biggest customers for what is known in the trade as sacking. These markets have now disappeared. Jute manufacturers are said to have amassed fabulous fortunes in the last war. I doubt if the process is being repeated in this, for the loss of overseas markets, effective price control, high taxation and rising costs of production must be written down against the very substantial orders which the industry has received from the governments of the United Nations. It is noteworthy that as I write this chapter the mills have announced their decision to curtail working hours, and to seal a percentage of looms in order to restrict production. This is not because of any lack of demand for jute goods, but on account of the lack of transport. I have mentioned this, and the other circumstances enumerated above, to show that whatever sort of capitalistic

paradise the Indian jute industry may have been in the Great War of 1914-18, the same halcyon conditions have not so far prevailed in the even Greater War in which we are now engaged. None the less, there is still a generous margin between the overhead prices of manufactured goods and those of raw materials, and this yields a substantial profit, the existence of which I imagine no mill manager, or his managing agent, would deny.

When the layman thinks of the jute industry and the war, his thoughts inevitably turn to the cheap, unlovely and homely sandbag. And rightly so; for whatever else the jute industry may do for victory, and I shall make reference to these things later on, the Indian sandbag goes forth to all parts of the world to find a place in every kind of military operation and civil defence. I have heard people talk of the jute industry and the war in a curious, deprecatory sort of way—as though it was a rich and vulgar relative who had made his money by questionable methods. Some people seem to imply that, if the business community of Bengal was really patriotic, it would give up manufacturing jute goods altogether and concentrate on making Bren guns or aeroplanes or submarines. The strategic and economic importance of a great industry, which is highly concentrated, compact and well organised, whose production can at once be turned over from peace to war purposes, may be obvious to them, but as a proposition it would seem to be lacking in that type of excitement which war is expected to provide on all its fronts, including the economic front. Of course, the plain fact is that, even in war, the elementary laws of economics continue to hold good; different

parts of the world continue to produce those things for which nature has specially fitted them. Tin comes out of Nigeria and jute out of Bengal, to mention only two of the minor facts of creation, but I have heard it argued, as though there was something reprehensible in it, that too large a portion of the sum total of India's war effort in the field of Supply derives from her textile manufacturing capacity, of which the jute industry forms an important part. And pray why not? Thank goodness there are still enough sane people in the world to insist that we shall make the best use of the things that are to our hand; that tin shall be mined in Nigeria and jute grown and manufactured in Bengal, and that neither shall waste their time trying unsuccessfully to make motor cars or to can fruit. Some readers, particularly those outside India, may wonder why I have thought it necessary to digress somewhat from the main theme of this chapter, which by now should be getting down to a statement of hard facts and figures. The truth is that the jute industry, like the prophet, is somewhat without honour in its own country, and if we are to get those things which make up the sum total of India's war effort into their proper perspective that impression needs radical correction.

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Now for the hard facts. The first thing to note about Indian jute manufacturing is how exceedingly well the industry as a whole has been organised. This condition has only been attained as the result of much tribulation in past years, but it stands out in contrast to the spirit of *laissez faire* which still largely informs the Indian cotton industry. The potential productive capacity of India's jute mills is far in excess of world demand, so far as the latter can be calculated.

In order, therefore, to avoid wasteful competition, harmful alike to the industry and to India, almost all the mills have banded together in one body which is called the Indian Jute Mills Association and which, amongst other things, operates and controls a comprehensive agreement governing hours of work and the rules by which mills' purchases of raw jute and sales of the finished product are standardised. According to his personal predilections the reader may appraise for himself the desirability of such an arrangement in peacetime; but there can be no doubt whatsoever of its value in wartime, when it provided an obvious means of mobilising a strong, disciplined, and co-ordinated industrial force in the service of India and the Commonwealth. Trusts, combines and cartels are rightly regarded by the public with some suspicion; but it is obvious that in time of war a strongly integrated industry, such as the jute industry, is able to adapt itself to the nation's work much more expeditiously than one in which all the forces of competition are allowed to work themselves out to their conclusion. From the beginning of the war, indeed from before the war, the Government of India acting either for itself, or as the agent for His Majesty's Government, was quick to take advantage of a situation in which in fact there existed a ready made Control. The jute industry was the first and largest of the industries in which there was put into operation the principle of utilising an industry's own organisation for purposes of liaison with Government, whose control has thereby been far less obtrusive, but no less effective, than might otherwise have been the case. I well recall that some people expressed grave doubts as to whether the Chairman of the Indian Jute Mills Association could also fill the office of Adviser on

Jute Supplies in the Supply Department satisfactorily. But he has done so, and the same system has proved to work so well, that it has since been extended to the engineering industry, the woollen industry, the tanning and leather industries, petroleum products and rope supplies. Official orders for sandbags began to come forward from Britain through the Government of India a good many months before war was actually declared, and the authorities very wisely entrusted their allocation to the Chairman of the Indian Jute Mills Association from which practice sprang the relationship we have glimpsed above.

In spite of the Brobdingnagian total of the number of sandbags manufactured for various governments, this represents nothing like the total manufacturing capacity of the industry. For instance, had it been necessary, all the sandbag orders, placed in the year 1940, could have been produced by the jute mills in Bengal in one month. Orders running into hundreds of millions of bags have from time to time been headline news, but working on the basis of a 60 hour week the hessian looms alone in Bengal mills can produce 93 million bags per month. I have not been able to make a comparison between the consumption of sandbags in this war and the last. It is probable that there is not, in fact, a great deal of difference; for though bags may now be less in demand for trench warfare, their use in civil defence has been greatly extended. On the other hand this war has seen the development of the rot-proofed bag, whose life is from ten to twenty-five times that of an ordinary un-proofed bag under similar filling and climatic conditions. The rot-proofing process was devised by the Indian Jute Mills Association's Research Department after exhaustive tests had been carried out here and

in Great Britain, and is the kind of practical contribution to the problems of war which one might expect from an industry that is eminently practical in its outlook. The cost of the process is not much—less than half an anna per bag—thus enabling the jute mills to maintain their policy of supplying Government's requirements at the reduced rate of slightly less than two annas per bag, a price well below the market rate for jute manufactures, in spite of rising costs of labour, raw supplies, stores, etc. So much for sandbags.

There are other products which the industry is producing for the war, many of them entirely new. The most interesting is a canvas which is a union of cotton and jute. This, after suitable treatment, goes into the making of gas-proof capes, though its chief value lies in the fact that it is an excellent substitute for flax canvas. This is in addition to the regular lines of jute canvas, which the mills produce in a variety of forms particularly suitable to war requirements. Some are even turning out an all-cotton canvas at the request of the Army authorities. Khaki webbing is another specialised product which the industry is now manufacturing, besides haversacks, belts, ammunition pouches and other parts of a soldier's equipment. Yet another interesting new article, which several mills are now producing, is a line of two or three inch wide hessian strips, dyed to colours specified by the Defence Department, for camouflage purposes. The figures I quote below show that hundreds of millions of yards have been supplied, and attention has now been turned to making jute nets, through which these strips are threaded, thus hiding gun emplacements and other military objectives from enemy aircraft. I cannot deal in detail with each individual textile item which the industry is supplying to the fighting forces, but



Sir Muhamad Zafrulla Khan, K.C.S.I., now Agent-General of the Government of India with the Chinese National Government in Chunking, formerly combined the offices of Law Member and Supply Member in the Viceroy's Executive Council, of which he was a Member till July 1941

I would add that amongst them are pull-through cords for cleaning rifles, anti-blast fabrics, special twine for harness and saddlery factories, fabricated water-proof stores and, of course, hessian cloth and sacking bags for packing foodstuffs and other goods. From the beginning of 1939, when the first large sandbag order had been placed, up to the end of last year (1941) war orders of approximately Rs. 25.14 crores had been placed with the jute mills of India. In the first five months of 1942 orders for approximately a further Rs. 6 crores were received, bringing the total since the beginning of the war up to roughly Rs. 31 crores. Last year approximately 46½ crores of sandbags were ordered and made for governments here and elsewhere, of which 15 crores were rot-proofed by the process referred to above. Over 15½ crores of yards of hessian cloth was shipped to the various Defence Services, as well as 11½ crores of yards of scrim cloth for camouflage purposes and a considerable quantity of other materials, including over 45 lakhs of yards of canvas.

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Only a well-organised and experienced industry, accustomed to looking at things in a big way, could have undertaken production on the scale suggested by the figures I have just quoted. But this is not all. There are other branches of the jute industry's war effort to which some reference must be made, if the picture I have attempted to draw in this chapter is to be in any way complete. Within itself, and from its own auxiliary machinery, the jute industry runs a Munitions Supply Section which, as its name suggests, is engaged on the production of munitions as distinct from textile stores. Quite apart from the fact that the

on the personnel and resources of the industry itself. From the beginning it was decided that the making of rough shell bodies in mill workshops was not a practical proposition, and that if the mills were to make the best use of their remaining workshop machinery it would be in the capacity of a "feeder" to the main stream of munitions production. It was decided, therefore, to concentrate on the manufacture of base plates and transit plugs for shells, wheel nave assemblies and pipe boxes for gun carriages, cast iron weights for defence usages and component parts for armoured vehicles. Average production now is in the neighbourhood of 200,000 units per month, though monthly output varies, and is sometimes held up for want of steel. It has been something of an uphill battle, for it has to be remembered that initially the most readily available machinery in mill workshops was loaned to factories exclusively engaged on the production of munitions. What remained has had to be grouped and organised to the best effect, and labour has had to be trained in over seventy jute mills workshops. It would be a mistake to imagine that these shops are employed whole time in war work. They are not, for the maintenance of mill machinery is both difficult and important in wartime, when replacements are not easy to come by. The production of munitions does, however, mean that no machine tool is ever idle, and frequently jute mill workshops are working double shift in order to keep abreast of both branches of their work. The figures of the first eight months production show how sharply, from a very tentative beginning, output has been stepped up.

	Components per month				
March	2,400
April	29,200
May	51,700
June	62,900
July	106,000
August	105,300
September	117,600
October	134,500

Higher figures might be quoted for the eight months November 1941 to June 1942, but this earlier set illustrates the emergence of the scheme from the chrysalis to the mass production stage which, to my mind, is always much more interesting than the later phases of assured success. Even from the beginning the number of rejections of components by the Government inspectorate has been remarkably small, nor has the introduction of piece-work payment produced careless or inaccurate work. The ready adaptability of the Indian workman is to a very large extent responsible for this. The chief engineer in charge of the whole scheme relates how he was visiting a workshop one day in the early stages of production with the idea of checking over finished base plates with a micrometer graduated to $1/10,000$ ". The head mistry was very interested in the proceedings, but not impressed with the micrometer. A considerable number of base plates were checked over and all found to be the same diameter within $1/1,000$ ". On being asked the secret of such accuracy the mistry produced, from the folds of his clothing, his set of "master" gauges. In appearance they resembled bits of wire and hairpins. With reluctance he allowed them to be tested by micrometer.

The degree of accuracy was found to be very fine indeed. How and when they were made was not divulged, but the secret of accurate workmanship lay in the fact that each operative had to submit his gauges to the head ~~mistry~~ twice a day for check against the "master" set. The degree of accuracy to which an Indian craftsman can work, even with indifferent and out-of-date machinery, is frequently a source of amazement to the trained European engineer. Finally, there is one other novel way in which the jute mills are joining in the common effort, and it is so far divorced from their normal role as to seem to me to provide a fitting epilogue to this chapter. It is the dehydration of potatoes. These tubers, as you may or may not know, consist of eighty per cent water, ten per cent skin and only ten per cent of edible matter. It is obviously a waste of valuable transport space to carry around the ninety per cent of valueless matter, so the Indian jute mills, at the request of Government, have installed a special plant, trained labour and built up an organisation which is now skinning, slicing and dehydrating sufficient potatoes to meet all the demands of the military authorities. A dehydrated potato is not a romantic object on the beauties or merits of which I might appropriately close the story of jute and the war. But then the jute trade is itself prosaic and matter-of-fact, rather than romantic. It goes quietly about its business, and gets on with the job, qualities which are the more valuable at a time when so many people claim to know so much about everything—particularly other people's jobs.

CHAPTER IX

THE LITTLE MAN

One of the great social achievements of the third decade of the twentieth century is the discovery of "the little man." Of course, he had existed almost since the beginning of time; but some years ago a famous cartoonist gave him concrete form and shape. The popular press, with expert judgment, saw that he had permanent news value, and very soon the world was made aware of his hopes, his fears and his aspirations, and the little man himself began to realise that, in fact, he was the salt of the earth, the backbone of every country and the mainstay of every community everywhere. The revelation came as a pleasant surprise to all concerned. Strube has given the little man a bowler hat and an umbrella. Mr. Priestly, with his deep humanism, very often voiced his thoughts on the radio and in the weekly reviews. That is, Mr. Priestly speaks for the little man of British birth and descent. For one of the larger qualities of the little man is his universality. There are (or were) little men in the Axis countries; there are little men in the Middle West and there are little men in the Antipodes; there are little men in Russia, working the nether, rather than the upper, end of the Communist machine; there are little men in Greenland and there are little men in India. Yes! even in India. And it is about the little men in India that I want to say something in this chapter.

The little man in India does not wear Strube's

bowler hat, but very often an umbrella is the unmistakable badge of his rank and authority. In the city he is frequently the sort of chap who runs a one-man forge, such as one sees so often in and around Lahore, driving the bellows with his foot, the while he manipulates the furnace and its contents with his hands. Or else he is a *mister*, who, in spite of his apparent inability to speak any known language, performs miracles on your radiogram or motor car. If he is a town dweller you will find him at a football match on a Saturday afternoon waving his umbrella in support of one of the crack Indian soccer sides. If, as is almost always the case nowadays, his favourite Indian team is perchance administering a drubbing to a European eleven—then so much the better. In its own way, and at its own tempo, the life of the Little Man in India is not so very different from the life of the Little Man Anywhere Else in the World. But there is a fundamental difference in the respective places in the scheme of things between the little man in India and the little man in most other countries in the world. The latter has settled himself into a position of reasonable assurance, and moderate comfort, in the twentieth century economic order. The Indian craftsman, for that is what, in the majority of cases, the little man in this country really is, has still got to come to terms with large scale industry in a land which is almost the sole remaining example of the classic capitalist state. However, that is looking into a future in which India will have to work out her own economic and political salvation. Like Mr. Gandhi, with whom I do not otherwise compare myself, I confess to a preference for the craftsman over the machine minder, though in an age which has developed such a profound preference for mass produced, machine-made goods the decline

and ultimate disappearance of the Indian craftsman seems to me to be as inevitable as has been the process in, say, the Cotswolds. There are those who think that most of our labour troubles do not derive from any dispute about the distribution of the profits of industry, but spring from the more fundamental crushing of the workman's self-respect by mechanical labour, in which he is quite unable to express his real self in any way. There is a great deal in the contention. I am quite sure if it had been ordained that, instead of writing for a living I should work over a bench, I would much sooner work in the way that I once saw cottage craftsmen in Nasik than direct, for eight or ten hours a day, a long ribbon of liquid rubber into matrices fixed to an endless belt—a process which was more recently shown to me with pride in an aggressively new Indian factory I had occasion to visit. I realise quite well that we cannot have everything made by hand again, and I have been too often importuned on the railway stations of India, by itinerant vendors of so-called hand-made goods, not to know that a great deal of the rubbish that passes for handicraft is the spurious product of bastardised processes, which are completely unrepresentative of both factory and cottage worker alike. Mr. Gandhi's economic theories have been criticised as medieval, even archaic; and it is a fact that they cannot be properly understood without reference to his political doctrine. Guy Wint in "India and Democracy," in a sparkling chapter on the Mahatma, says that "like the rulers of Etewhon he aims at blotting out the Industrial Revolution." And to the European or the American, to whom the Industrial Revolution is now merely a chapter of the history of the nineteenth century, his economic teaching is incomprehensible. But so far as India is concerned, his insistence

upon the importance of home industry, as symbolised by the cult of the charka, is grounded in the hard facts of village life. For do not forget, dear reader, that well over 300,000,000 people live in 700,000 Indian villages, against which there are less than 45 towns of over 100,000 population. On a long view, the Indian craftsman may be as surely doomed as his counterpart in other countries of the world. But, in my judgment, it is going to take a much longer period of time than any of us now living can foresee to put him out of business effectively. For it is not only Indian large scale industry that has received a fillip as a result of the war. The conflict has given to the owner-worker of smaller industrial units a new importance in the national economy. His products are in ever-increasing demand, and both he and the things that he makes have been brought into closer touch with the consumer at home and abroad. Integration is a term much beloved of economic writers at the moment. In a word, India's small industries have been integrated by the war. Some of the advantages thus gained must survive into the peace. Its an ill wind that blows nobody any good. The Indian craftsman will certainly emerge from the conflict richer in rupees and experience.

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Here are some of the larger facts of the matter. The average man, who in so far as he is average, represents a large part of the hopes and the fears of the little man of this chapter, ultimately reduces most of life's problems to terms of pounds, shillings and pence or rupees, annas and pies, as the case may be. And for all of us it is probably the most convenient way of assessing the value of any proposition. During the financial year 1941-42, direct war orders to the value of Rs. 498

lakhs were placed with small scale industries in India. The main items making up this total are camouflage nets (Rs. 182 lakhs), woollen blankets (Rs. 118 lakhs), leather goods (Rs. 96 lakhs) and pith helmets (Rs. 43 lakhs). Nothing very much to boast about, I hear one or two readers saying. Well, if the captious critic thinks these figures of little significance, I suggest he might work them out for himself in terms of other currencies, and I will help him to the extent of recording that one lakh of rupees, or one hundred thousand rupees, is worth approximately £ 7473/19/2 or \$ 30, 053. During the current financial year 1942-43, the year in which I am writing, additional orders to the value of Rs. 610 lakhs have been placed with small scale producers. These include cotton textiles worth Rs. 186 lakhs, leather goods Rs. 84 lakhs, camouflage nets Rs. 71 lakhs and pith helmets Rs. 65 lakhs. As I look at the preceding dozen lines, I see that I have again committed to paper one of those dry and uninspiring statistical statements that I have tried hard to keep down to a minimum in this book, though I cannot possibly eliminate them entirely from the story. To those who share with me a dislike of figures for their own sake I apologise, but to others, who suffer no such revulsion, I would point out that, during two administrative years, orders over only the small range of goods so far quoted have been placed on the little men of industry to the extent of Rs. 1008 lakhs, or approximately £8,280,084 or \$ 33,298,742. Thus expressed, the figures do not look quite so insignificant. Translated into terms of new work and wages coming into small workshops and cottage homes, these sums of money mean something substantial. For remember that they are in addition to income ordinarily accruing, and that, quite apart from official orders, hostilities have brought



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an enhanced civil demand for what are called 'country-made' goods, in consequence of the severe curtailment of imports and the switch over of the large Indian manufacturing concerns exclusively to war production. What do these figures mean in terms of individual prosperity? It is a difficult calculation to make; indeed it is well-nigh impossible. But here is the history of a case that must be representative of many others. The managing director of a large Indian joint stock bank in Bombay told me of two workmen who came to him for finance to undertake a small Supply job in the capacity of sub-contractors. All they required for this initial adventure was the loan of a sum of Rs. 500, which was given to them. A few months later they had done so well as to accumulate contracts justifying permanent financial accommodation of Rs. 25,000. I suggest that this furnishes some proof of the growing industrial stature of the small man as a result of the war, no less than the wise use of the banking system of the country.

Not all the products of small scale industry are as good, or as cheap as might be obtained elsewhere; and those upon whom the task of organising its production for war has fallen are fully aware that there are great variations in the quality of the work, as it is difficult for industry of this class to work to narrow tolerances. Nor, again, is the small shop able to work to the prices which are possible in mass production. On the other hand, quite apart from the compelling necessity of increasing output by any and every means, the use of small scale industry extends employment and disperses production, at the same time relieving larger factories for other work. Those who have given more than superficial consideration to the figures quoted above will have noticed that during the second

administrative year quoted, the 1942-43 period, cotton textiles make a first appearance in the list of orders placed, and indeed their rupee value is very nearly one third of the total for the year. This is clearly because the large cotton mills of Bombay, Ahmedabad, Sholapur etc., are working to the fullest possible capacity, and indeed it is anticipated that by the end of January 1943 the Supply Department's requirements of cotton textiles will have reached 1,100 million yards per annum, valued at about Rs. 50 crores, whilst contracts for other items handled by the Cotton Textile Directorate are expected to reach a total of Rs. 25 crores to Rs. 30 crores in value. These figures give some idea of the pressure under which the cotton textile industry is working,¹ and by comparison the Rs. 186 lakhs worth of orders placed with cottage weavers of cotton goods looks completely dwarfed. Actually it is rather less than four per cent of the total requirements of cotton cloth during the current twelve months, and whilst it is doubtful if production in the Indian mills can be stepped up very much more, production in the cottage, and the small one-man weaving shed, is probably capable of expansion till it reaches at least ten per cent of the whole. Just how acute the problem of producing sufficient cotton textiles for the Commonwealth's war needs (a proportion of India's output is for non-Indian consumption) is evident from the recent decision of the British Minister for Labour to draft back into the Lancashire cotton industry several thousand women operatives who had secured employment in shell-making. So that every little help, and the Indian peasant-weaver's output obviously has a rising marginal value. The chief problem is to bring him into

¹ I deal with the cotton textile industry in a separate chapter.

line with the war machine as a whole. To this end an agreement between the Supply Department and the Provincial and State Governments, for planned production for small industries, has been devised and is now in operation. Most Provinces, and many States, have established official agencies with whom the Department of Supply contracts for the production of certain goods which can suitably be manufactured by small industrial units.

These official agencies—which in the case of the Provinces are the Directors of Industries and/or the Registrars of Co-operative Societies—are responsible for the acceptance and execution of orders, including the supply of raw materials, provision of finance, instruction in manufacture, inspection during production, delivery of goods to the Supply Department, and final payment to the manufacturers. The actual allocation of orders to these official agencies is done through Controllers of Supplies, who are given quotas for each area. The Controllers also supply specifications and manufacturing information, where needed, and settle prices. The working capital is ordinarily provided by the Provinces, but the Government of India affords financial assistance within certain limits, where necessary.

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Organising and focussing the small industries are, by now, two of the main tasks of Supply policy in this country; and in this connection I would beg the reader to understand that, in the present context, organising and focussing is by no means the same thing as rationalisation or regimentation, as those processes are understood in the West. In the case of India's small and cottage industries it means, in a very real sense, beginning from the beginning. But the advantages are

crystal clear. A lot of raw material that would otherwise lie dormant is being brought to light, and skilled labour in out of the way places is now being harnessed to the economic system of the country. Conditions vary from one part of India to another, and one thing which has impressed itself very forcibly upon me in the last few months is how much of the success of small industries depends upon the personal enthusiasm of the Directors of Industry in the several Provinces. To the extent that this is a very variable quantity, small industries differ in their efficiency and utility as between one Province and another. Province "A" may possess a keen and vigorous Director of Industries in contrast to Province "B", but less natural resources than the latter. The chances are, however, that Province "A" is doing a better all-round job of work than its more generously endowed neighbour. The New Zealand missionary, Rewi Alley, is said to have accomplished wonders in organising small industries in China, where cottage workers are reported to be even producing tommy guns. I believe at one time there was an idea of bringing Rewi Alley to India, and I can only regard it as a pity that nothing has come of it, as I should have thought it an eminently worthwhile investment on the part of the Government of India. What has been a success in China will not necessarily fill the whole of the bill in India. But so far as production by the small man is concerned, we face many common problems, and it would be interesting to know how far the authorities of the two countries are exchanging information.

At the time at which I write the principal lines of production upon which small industries are being encouraged to concentrate are textiles, woodwork (such articles as shelves) and leather. If, as the Director-

General of Supply hopes, the industries respond and produce results, they will be encouraged to manufacture other important articles of supply, notably a wider range of iron and steel articles. That they are fitted for the task is evident from the existence of cells of hereditary metal workers who are scattered over the land. These skilled workers are survivors or descendants of the craftsmen of earlier generations, and they are to be found in Rajputana, the Punjab and other parts of the country. For instance, at Wazirabad there is to be seen a colony of skilled workets, whose forbears were probably manufacturers of scimitars, swords etc. who are now wholly engaged in manufacture of surgical instruments and cutlery for the Department of Supply. When one comes to think it over, that constitutes a quite remarkable industrial metamorphosis. Again, in Jaipur a man recently made a spring of a watch out of a piece of hoop iron. Genius of this type is under constant observation, and wherever possible it is being turned to the practical use of the war effort.

On the other hand the departmental official has to guard against allowing natural enthusiasms to run away with his better judgment. He has, for instance, to distinguish clearly between supply items, the raw materials for which are difficult to obtain, or are in short supply, and those for which the raw material is easily found. For example, all metals, and particularly steel, are in short supply, and it is the merest commonsense that they should be placed in the first instance in the most efficient hands. It would be most imprudent to leave competent workshops partly idle, and at the same time endeavour to place orders on small scale industry. It is not worthwhile to risk a waste of material for the sake of sentiment, when established and efficient means of production are available. Again

taking the case of metals, present Supply Department prices are based largely on war contract rates for steel. Supplies made from bazaar steel, upon which the small man mainly relies, would be much more expensive.

One of the larger difficulties in the way of bringing the village crafts-man into line with the Supply machine is what I may call his immobility—his ingrained reluctance to leave his home for a factory. This point was made very clear by a labour training expert at a conference of representatives of Provinces and Indian States, which the Supply Department convened earlier this year with a view to making greater use of small scale industry for war supplies. The Principal of the Delhi Polytechnic, who at that time had some 1,600 men under training, mostly for the technical units of the Army, considered that two types of production centres should be developed, namely (a) large centres accessible from the point of view of transport, and inaccessible to raiding aircraft and (b) small centres, in areas where industries were already in existence. In his experience one month's training for an artisan, who had some background of craftsmanship, was sufficient to turn out a skilled and specialised manual worker; whilst three months had been a long enough period to train artificers up to a government arsenal standard.

It is not possible in the course of a single chapter of this book to enumerate and describe every article, and every process by which small scale industry is contributing to India's war effort. Wherever I went, I found that the reputation of Bengal and the United Provinces cottage workmanship stood especially high in the esteem of the others. For instance Bengal had produced from her cottage craftsmen some six million pith helmets in a year, against a peacetime output that was less than two hundred thousand. She has other

achievements to her credit, but I will not stop to contemplate them, for Bengal is my own Province, and I might be accused of bias in her favour. But, take the case of the United Provinces, a part of India where small scale industry seems to be in its most natural setting. United Provinces weavers, including those in Benares State, are doing the lion's share of the manufacture of handloom blankets in India. I deal in another chapter with the larger industries of the Province, and the present reference is exclusively concerned with the activities of the little man. Woollen blankets are now going from the cottages of the Province to the fighting services in a steady flow of several thousands a month, and the undernoted table gives a quick picture of the extent of the trade the handloom weavers of the U. P. are now doing under this one head of manufacture. These statistics apply to the calendar year 1941:—

1. Number of blankets supplied 4,20,000
2. Weight of wool consumed .. 2,85,000 lbs.
(produce of 30,00,000 sheep) or 35,600 mds.
3. Length of yarn .. 10,12,51,76,320 yards
or 57,52,770 miles
4. Length of blankets 601 miles (60" width) supplied.
5. Wages paid :

				Rs.
1. Carders	..	..	..	85,500
2. Spinners	..	..	..	2,06,715
3. Weavers	..	..	..	2,60,500
4. Millers ..	..	..	..	1,57,500

Total wages 7,10,215

With Bengal, the United Provinces cottage workers are extensively engaged in the manufacture of camouflage netting, and other things which the small factory

inners of this versatile Province are making all cutlery and the manufacture of musical instruments, in which indeed the town of Meerut enjoys a virtual all-India monopoly, and Meerut-made musical instruments are in almost exclusive use throughout the Indian Army. And so on. In addition to the Director of Industries, who secures the business from the Supply Department, the Government of the United Provinces have appointed a special War Production Commissioner who, as his title suggests, is mainly concerned with the production aspect of the transaction. At an earlier stage of the war, before the smaller industrial units had been brought into their present effective relationship with the Supply Department, Government had three alternatives by which they might achieve the end in view. They could have appointed "parent firms" in the different Provinces and States, or they could have created producing syndicates or, by agreement, they could recognise an official agency in each Province or State. They chose the last, and in my opinion there is very little doubt that they chose wisely. Both the parent firm and the producing syndicates have much to commend them, but where, as in our case, time is an important factor, the most sensible way is to make use of the ready to hand machinery of Provincial administrations.

The method of controlling the small industrial unit through the agency of Parent Firms is in common use in the United Kingdom, and has also been tried in Australia. It involves the appointment of a competent firm to employ small producers within a convenient area, and to take responsibility for their output. Thus, a Parent Firm may accept a government contract on the understanding that it will arrange for contracts to be made by a number of small pro-

ducers and assembled in its own workshop. This system differs from sub-contracting in that it places the Parent Firm in the position of an agent, rather than a principal, in relation to the small producers whom it employs. The method has been adopted in India more or less successfully in selected transactions, mainly in connection with the supply of engineering stores. But its wider application was rejected as unsuitable for this country, where it was felt disputes and allegations of unfairness would probably be frequent. An experiment was tried in Calcutta in the creation of producing Syndicates, but without great success. A Syndicate consists of members capable of doing work of the same kind, appoints its own office-holders and undertakes the execution of contracts as a unit. In some respects it resembles an industrial co-operative society, and in action would probably exhibit the same weakness. Whilst a few such bodies might perhaps have been organised and worked successfully under energetic supervision, the method is not one that lends itself to quick adoption all over India. Thus, the Supply Department were thrown back on the agencies which had already shown some ability to cohere the output of small industries, namely, the Provincial authorities. Upon them has fallen the responsibility of "tuning in" the resources of the Provinces to the requirements of the larger war machine. Their task is not easy, for they must be capable of dealing with large numbers of small firms and individual workers, whose craftsmanship may vary widely in quality, and whose capacity to read blue prints and understand specifications, or even to read and write at all, may be limited. The Provincial authority must be staffed so as to educate and supervise the small producers with whom it deals, not only in compact urban areas, but

in rural areas where communications are poor and decentralised supervision is essential. Finally, the Provincial authority must be in a position to provide working capital, and to make prompt payments for all work done. The Supply Department, as the all-India authority for the purpose, is mainly concerned with devising forward programmes of production to be allotted to the individual Provinces. Obviously, some demands prove easier of execution and, therefore, more popular than others, but the correct objective is to secure a fair allocation both of difficult and easy demands. Another most important point, which has to be taken into consideration in making allocations on small scale industry, is economy of transport. This is a matter that can only be dealt with adequately by a department of the Central Government, such as the Supply Department. Costs, finance and inspection are complicated matters, the details of which are of more interest to the official than to the layman. Goods produced are accepted by the Supply Department after they have been passed by its regular inspectorate. This final inspection is independent of, and in addition to, an earlier "stage inspection," which is the responsibility of the Provincial authority.

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It is not possible in this narrative to give a detailed list of the dozens of items of Supply that are being made by small scale industrial units. As the war proceeds and productive capacity is stretched still further, the number will inevitably be added to, and the importance of the little man will grow. For Indian Supply policy is being increasingly directed towards bringing his craftsmanship up to mass production standards. This is in contrast to the intentions of our

enemy on the other side of the Bay of Bengal. W.S. Munday, who had recently visited a village north of Akyab, reported in the *New York Times* of July 23rd last that "everywhere, in both industry and farming, the Japanese are eliminating the small man by the establishment of large all-embracing organisations directed by the Japanese". Whatever be the merits of the large scale organisation of industry (and it would be foolish to dispute them) giant factories cannot be conjured up in a day, a month or a year in a country such as India. The small craftsman has his place in both the urban and rural economy of the land and, to come back to the proposition with which I started this chapter, he is likely to maintain it for a long time to come. In the circumstances, Government would have been guilty of the grossest negligence if they had not sought to incorporate his talents into the great stream of war production from which flows equipment for our own Defence Services and those of our Allies. Apart from any question of industrial technique, there are also certain social implications inherent in the problem of the little man. So far as he resides in rural areas, he is almost always bi-occupational. He is a craftsman and a peasant, though he is always tending to become more of a craftsman and less of a peasant, as villages enlarge into towns, and the industrial erosion of the countryside proceeds from one generation to another. In a country the size of India the process is more real than apparent. On balance, however, the little man of industry keeps away from the big centres of population, and maintains himself where he can enjoy a monopoly or semi-monopoly of his craft, avoiding the competition of the larger and more highly organised producer; or else, as in the case of some of the colonies of metal workers to whom I made reference ear-

lier, where he can take advantage of a sort of medieval guild life and usage. Government might, by rigorous regimentation, have succeeded in bringing all these workers together under the roofs of large factories; but I doubt it. And almost certainly the game would not have been worth the candle. It would have meant breaking down a hard core of conservatism, no less than the infliction of social hardships that would not have been offset just by the conferment of higher wages and the discipline of factory life. And finally, it would have left lacunae of varying sizes in India's rural economy. The present system may savour of the compromise so beloved of British and Indian administrative tradition but, taking all the circumstances into consideration, I cannot doubt that the right decision has been made

CHAPTER X

THE INDIAN ALUMINIUM INDUSTRY IN PEACE AND WAR

The further development of the Indian aluminium industry is one of the things specially mentioned by the United States Technical Mission, as being both feasible and desirable. Actually the tempo of production and fabrication has been greatly increased since the beginning of the war, and at the time the U. S. Mission reported plans and plant for a considerable extension of Indian production were well advanced. I shall return to this project later. Meanwhile, I will do no more than briefly remind readers of the extent to which, in recent years, alloys have replaced pure metals for purposes of both war and peace—and particularly for the purposes of war. New alloys have been developed to economise the use of more valuable metals, and the whole group of non-ferrous metals, of which aluminium is a member, fall into the category of essential strategic materials. Aluminium is possibly the one such material in which the Axis powers achieved a favourable supply position from the beginning of the war. Italy, Germany and Hungary combined to produce about one fourth of the world's bauxite, and this proportion was still further enhanced for the Axis with the collapse of France and the conquest of Jugoslavia. It will be recalled that in November 1941 the United States of America considered it necessary to take

special precautions to protect her own supplies of bauxite, and a contingent of the U. S. Army was sent to co-operate with the Netherlands forces in the protection of the bauxite mines at Surinam in Dutch Guiana, from which it is estimated sixty per cent of the bauxite requirements of the great U. S. aluminium industry derives. A year earlier a public appeal had to be made for aluminium scrap in Great Britain, which normally imports only a relatively small proportion of its aluminium requirements in the form of bauxite, about eighty per cent being imported in the form of metal. Such bauxite as Britain wanted ordinarily came from France, whose defection subsequently rendered the British industry dependent upon British Guiana and the Netherlands East Indies. The latter was ultimately to pass into the hands of the Japanese, and thus another of the few remaining sources of supply dried up. The practical benefits of this acquisition by Japan are more apparent than real. The cost of building plant and the supply of power is a major, and the cost of the raw material only a minor factor in the ultimate cost of producing aluminium. I have not been able to check their accuracy, but figures which have been given to me put Japan's annual production of aluminium at 24,000 tons against the United States 400,000 tons. The Aluminium Company of Canada is by far the largest producer of the metal in the British Empire, and during the war, by arrangement with the Ministry of Supply, the Company carried out very large extensions to its plant, in which process it has been assisted by a twenty-five million dollar loan from the Reconstruction Finance Corporation, in order to meet the cost of extensions which would enable it to send increased quantities of the metal to the United States of America. I have laid this miscellaneous assortment of information

before the reader in order to demonstrate how important aluminium is in the business of war, entering, as it does, into the manufacture of so many munitions and items of supply and transport.

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Sir George Watt in his encyclopaedic "Commercial Products of India," which was first published as long ago as 1908 as an abridgment of the even larger "Dictionary of the Economic Products of India," records that it had been recently discovered that many of the rusty coloured laterite deposits "which cover large areas in the Peninsular and Burma" were identical with the substance known as bauxite, then becoming the chief source of aluminium. Like the original bauxite of Les Baux, these deposits were first worked, without success, as a source of iron. At the time Watt was writing he said it was not possible to furnish statistical returns of the extent to which the metal had been introduced as an Indian industrial material. He says that Mr. Chatterton, then Principal of the Madras School of Arts (later, I presume, the Sir Alfred Chatterton who was Controller of the Indian Munitions Board in the last war) launched the new industry so very successfully that others were induced to engage in the trade, and finally the School withdrew in favour of private enterprise, viz., the Indian Aluminium Company at Madras, which purchased the government aluminium department at the School. Other small and unimportant factories appear to have come into being about this time, but later disappeared. Watt says. "The impetus due to Chatterton's success would seem, however, to have given South India a hold on the aluminium trade that she is not likely to forego" So much for the beginnings of the Indian aluminium

industry, as revealed in the official archives. We have travelled far since then. The Indian Aluminium Company lasted until 1930, but in the interval other concerns had come into existence, mainly as the result of Bombay enterprise. Calcutta did not, in fact, enter the business until 1919. The industry reached its peak in 1930, when consumption reached a figure of approximately 7,500 tons, and the sales of aluminium utensils alone amounted to a sum of Rs. 1½ crores. In succeeding years consumption appears to have dropped sharply, and never seems to have risen to a figure higher than 3,000 tons, which is the 1938-39 figure, the last year for which statistics are available. Thus, India imported for fabrication 3,000 tons as compared with an estimated world consumption of 600,000 tons—not a very large proportion of the whole.

The bulk of the manufacturing industry is in the hands of the following concerns, and against each name is shown approximately the proportion which their output bears to the total all-India production :—

Jeevanlal (1929) Ltd. (Works in Calcutta, Bombay, Madras and Rangoon)	45%
Aluminium Manufacturing Co. Ltd. Cal- cutta	20%
Wolverhampton Works Co Ltd., Bombay ..	10%
Anant Shivaji Desai, Bombay	10%
Lallubhai Amichand, Bombay and Rangoon	10%

Of these, only the Aluminium Manufacturing Company and the Wolverhampton Works Company made any serious attempt to develop industrial uses for aluminium as against the domestic utensil, and of these two the Aluminium Manufacturing Company probably did most of the industrial business, which has mainly developed over the last ten or twelve years.

Pre-war industrial uses included the following :—articles and equipment for tea and rubber estates and factories; bobbins for jute mill manufactures; castings for electrical and engineering work, architectural work, transport, and equipment for paint and chemical industries. Incidentally, India had built up a thriving export business with Malaya, Burma, the Middle East and East Africa.

After the outbreak of war raw material supplies became limited, and finally ceased in 1940. The output of fabricated goods has so far been insufficient to meet the normal pre-war demand, and in consequence domestic utensil production has had to be reduced considerably, and is now only between twenty-five and thirty per cent of pre-war figures. This figure includes a fair proportion of utensils for the armed forces. Various steps have been taken to relieve the situation. The Jeewanlal Company, for instance, launched with characteristic vigour a campaign to collect all used and discarded aluminium utensils, as a result of which no less than 7,000 tons of scrap aluminium was put to important uses gain. As soon as the campaign began to show results, the company's plant was further equipped to refine the scrap and roll it into sheets for eventual use as civil and military cooking utensils, electric fan blades, aircraft fittings, containers for the chemical industry and as granules for the steel industry. The shortage of tin, which followed the loss of Malaya, has rendered aluminium goods even more valuable than they were a year ago. What I have said about the Jeewanlal Company applies to all the others, who have been almost entirely subsisting on scrap for the past eighteen months.

I have heard suggestions that the continued use of aluminium for domestic purposes in India is against

the interests of the war effort. But so far no demand made by Government has not been met by the manufacturers. All their orders have been supplied in full and in good time, whilst the maintenance of the chain of distribution has enabled scrap to be collected to the extent of more than twice the amount of utensils sold. If, therefore, the consumption of aluminium for domestic utensils were to be banned, the chain of collection of scrap would disappear, and what is at present the largest source of India's aluminium largely dry up. A further important point is that the ingot produced from the worn-out domestic utensil, even with the most careful refining, is not of the high quality essential for all aircraft work. So that the continuance of the present restricted consumption of aluminium utensils in India is doing no harm, but in point of fact encouraging and maintaining the system of scrap collection and purchase, which enables stocks of metal to come into the possession of those from whom Government know they can obtain it when required.

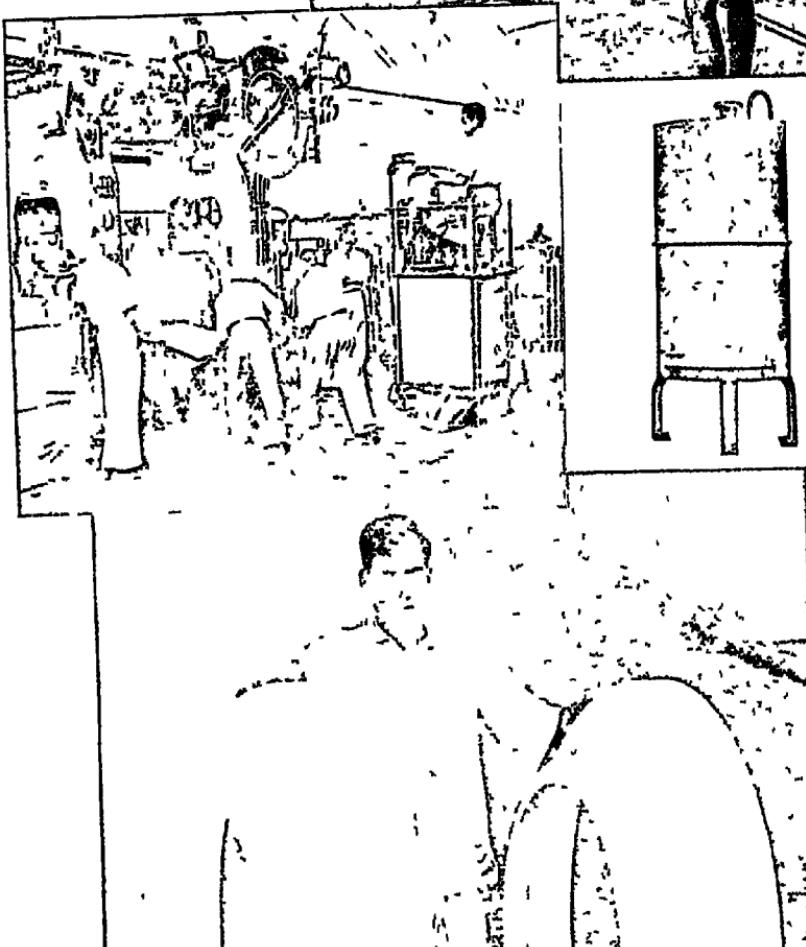
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Before passing on to describe the great new project by which India will secure her own supplies of aluminium from within her own borders, some reference must be made to the various other ways in which the manufacturing companies are assisting the country's war effort. The shortage of raw material, described above, sets a limit to their fabricating activities, but most of the companies are working to full capacity, for they are producing articles not only in aluminium but also in steel, copper and brass. These activities involve numerous and complicated tools, and considerable expenditure of labour and machine

Right : Tapping the melting furnace at the rolling mills of the Aluminium Production Company Ltd.



Below : Rolling Aluminium Sheet.



time. I have not been able to investigate the output of all the manufacturing companies I have named in this chapter, but the production schedule of the Aluminium Manufacturing Company may be taken as representative of the activities of the industry as a whole. The case of 3" mortar parts is an interesting example of the kind of munitions work which the industry has pioneered in India. The steel tube, which forms the cartridge container, originally could only be produced in this country by drawing a steel cylinder from steel sheet in nine operations, and some 30,000 of these were made and put into use. It was then found possible to make these tubes up from sheet and weld them, and the Company is at present doing the numerous machining operations involved in producing these at the rate of 50,000 a month. They have also started making the fins and welding them on to the cartridge containers, thus producing the complete tail unit. Similarly some 75,000 steel nose containers—a steel cylinder drawn from sheet in five operations have been supplied, but this has now been replaced by another metal. The fuse calls for a number of parts which are pressure die cast in zinc base alloys not hitherto handled in India. The Company undertook the experimental work, and established the manufacture of these parts in India. They are now producing some of the parts at the rate of over 50,000 monthly, whilst other firms in other parts of the country are doing the remaining parts.

As in the case of steel tubes no facilities exist in India for producing seamless drawn tubes, and the only alternative was to produce cylinders in five or six operations from copper sheet, and part them off into the copper driving bands for 2 pdr and 6 pdr sheets. These driving bands are now being produced at the

rate of several thousands of each monthly. Aluminium dust goggles are treated by a special process (anodising and subsequent dyeing) to give a permanent black finish. This particular process was established a year or two before the war on a small scale for commercial work, but the company has since expanded it very considerably. They have produced up to two lakhs of pairs of these dust goggles per month, and up to date have supplied a total of nearly two million pairs. These apparently simple articles involve fourteen different operations.

Instruments and the stands for various things such as range finders, etc. involve a number of small parts, many of which were originally specified in brass. Ultimately it was decided that only by die casting these in aluminium was it possible to obtain the large numbers required. There are about 25 different kinds of instrument components for which aluminium is now used, and the Company's monthly production of these parts runs well into five figures. Centre pieces for hand grenades are die cast aluminium parts, and at this particular works there have so far been manufactured a total of over six lakhs, present production having been cut down to 25,000 monthly. The industry produces the aluminium moulds on which the face-piece pieces and flexible tubing of gas masks are moulded. The valve holder is a die cast part, the manufacture of which the Aluminium Manufacturing Company established prior to the war. This is now produced by the Ordnance factories. Brass spigots for the canisters have been made as required, and this particular factory produced nearly two lakhs in the last six months. They have also produced over five lakhs of weights for rifle pulls through, by drawing up tubing from brass sheet, in plant of their own

design and manufacture.

A small number of jute mills are now using aluminium bobbins made in India, which results in a valuable saving in shipping space as they are the only alternative to the wooden bobbin imported from the United Kingdom. Manufacture has just begun of exploder containers. These are steel cylinders drawn from steel sheet in up to six operations. This is another job which normally only the Ordnance factories handle, and production of these containers for both shells and bombs should shortly reach five figures of each monthly. None of these articles are complete munitions of war in themselves, but they go to make up the now immense total of shells, bombs, mines and the like which India is producing. Additionally the recent large accretion of air strength in the country has brought a lot of new work to the aluminium industry. Apart from having to repair bullet-holed bomber tanks, the industry has recently completed a rush order for auxiliary tanks to enable machines of small flying range to get from Karachi to Calcutta and thence to China. Orders have also been received for large numbers of articles for refuelling purposes such as petrol filling funnels, oil measures, etc. From the foregoing, it will be seen that the industry has succeeded in making the fullest use of the surplus manufacturing capacity released by the shortage of raw material for making goods for the ordinary domestic market. From this point of view the shortage has been a blessing in disguise. The switch over from peace to war is probably best illustrated by the fact that before the war the Aluminium Manufacturing Company (to take the case of one company only) sold a yearly average of about Rs. 10 lakhs worth of utensils and Rs. 2 lakhs worth of goods for industrial purposes.

Their figures for the twelve months ending June 1942 are expected to show Rs. 2 lakhs worth of utensils and Rs. 20 lakhs worth of other goods, of which 85% is directly for military purposes, and the remainder on account of essential industrial equipment which formerly had to be imported. Since the war they have also supplied approximately 300 tons of aluminium ingot for Government and for steel-making, which is additional to the statistics already quoted. Their small pre-war European staff of six is now reduced to three, the others being on Government or military service, and maintenance of their rather specialised type of production has only been achieved by having over the last ten years or more trained up Indian engineering students, and later taking them on as production supervisors and tool designers. A large part of the range of articles I have enumerated require dies and tools of accurate design, and the whole of these are made in the factory itself. These are conditions that apply right through the industry, and are in no way peculiar to the Company whose production schedule I have selected for detailed description.

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I have no doubt that the reader, who has borne with me thus far in this chapter, will be asking himself a question which repeatedly occurred to me as I collected, and endeavoured to collate, the facts. What about India's own deposits of bauxite? Where are India's own supplies of virgin aluminium? In the preceding pages we have seen how a sizable fabricating industry has grown up in India since the beginning of the present century, and how its resources have been adapted to a variety of problems which the war has brought in its train. The existence of large scale

deposits of bauxite, suitable for the extraction of aluminium, in India has been known for a considerable period of years, and a great deal of work has been done by the Geological Survey of India, and notably by its present Director, Dr. Cyril S. Fox, in locating and prospecting these deposits. However, the comparatively small commercial demand for aluminium in India, together with the absence of large scale supplies of cheap electric power, and also the very large capital investment involved, for a long period of years proved obstacles to the establishment of an aluminium producing industry. In 1937, a survey was made of the possibilities of aluminium production and fabrication by British and Canadian experts, and, as a result of their findings, plans were made for the construction of an aluminium smelter in South India, using hydro-electric power, together with rolling mills near Calcutta. A company, known as the Aluminium Production Company of India Ltd., was formed for this purpose. Practically simultaneously, a separate enterprise, known as the Aluminium Corporation of India Ltd was constituted for the production of aluminium in Bengal, using electricity generated by steam power. At the outbreak of war, both these works were in the initial stages of construction.

The works of the Aluminium Production Company of India Ltd. in South India are now rapidly nearing completion, and are expected to come into operation by the autumn of 1942. These works will utilise power from the Travancore State Hydro-Electric Project. They have been designed and staffed by Canadian smelter experts, and all essential equipment, which cannot be produced in India, has already been received in this country and is in course of installation. The smelter, whose output will be fully sufficient to

supply India's wartime needs, has been designed so as to permit of rapid expansion as additional supplies of power become available. Operations will be started using imported alumina, of which ample stocks are already in this country, but eventually these works will draw on the bauxite deposits of the Bombay Presidency and Bihar.

Work is also in progress on the aluminium smelter of the Aluminium Corporation of India Ltd., which is located in Bengal, and a substantial portion of the buildings and plant has already been erected. These works will take their supply of power from a steam generating plant, using coal from local collieries. They are expected to go into production after the necessary generating equipment has been received and installed. The establishment of an aluminium producing industry in India will ensure self-sufficiency in the supply of this important strategic metal, which assumes an even greater importance with the establishment of an aircraft industry in this country. There are also possibilities of export to other Allied countries, both in the Middle and Near East and Pacific war zones. Apart from immediate war demands, in view of the growing use of aluminium in all branches of industry, notably in transportation, and of the ample supplies of raw material available, an Indian aluminium industry should be on a firm footing in times of peace.

In August 1941, the aluminium sheet rolling mills of the Aluminium Production Company of India Ltd., began operations. These mills have been constructed during the war, the necessary plant and equipment being imported from Canada and England, and are comparable in all respects with similar works in operation in Europe or America. They have already attained a considerable output, and are working on three shifts

on the rolling of aluminium sheet, of which practically the whole is for war requirements. In order to make the fullest possible use of the plant, other special work is being carried out for the Department of Supply and there is a possibility that fabricating facilities may be considerably extended in the near future. Operations of this type had not previously been carried out in India, and as a result training has been given to a further substantial number of Indian technicians and workmen in a new branch of industry. These works are at present supplying the raw material in the form of aluminium sheet to a number of manufacturers engaged on war contracts. I have already dealt at length with the manufacturing companies which were already in existence prior to the outbreak of war. Their works represented a considerable financial investment, and employ a large number of skilled workers. The larger firms have maintained fully equipped press shops, capable of dealing with all types of stamping operations. Quite apart from the wide range of munitions parts and equipment the industry is producing on its own account, it also serves other Indian industries which are playing an important part on the economic front. The rubber industry in India and Ceylon, which has taken on an added importance with the loss of Malaya, has always been an important consumer of aluminium for its equipment. Where aluminium equipment for tea gardens and factories was formerly produced, equipment for explosives factories, where aluminium is used owing to its non-sparking properties, is now being manufactured. The steel industry uses a substantial tonnage of aluminium for the deoxidisation of steel ingots, and the Indian steel works have been kept supplied with this essential raw material.

It is not for a layman to say whether the Indian aluminium industry could in the past have done more for the war effort of this country and her allies. The American experts who recently visited India are, however, of the opinion that more may be done in the future. I have merely tried in this chapter to outline the historical development of the industry, and to set down the facts of the situation as it exists to-day. So far as I know capital has never been wanting for the fabrication side of an industry that has such an obvious place in the scheme of things in India. Indeed, a very large proportion of the finance employed in the industry is purely Indian and in the latest projects, which I have just described, British and Indian capital and direction are working side by side to create an Indian aluminium industry worthy of the country's great natural resources. There has, however, never been anything like an adequate supply of technicians, supervisors and skilled labour, though the policy of the past decade whilst not producing a surplus of trained personnel, has relieved some of the earlier difficulties of an industry which has already played no inconsiderable role in assisting India to arm for victory, and which before the war is over may well be helping her allies to the same desirable end.

CHAPTER XI

RUBBER AND OIL

Napoleon said that an army marches on its stomach. Metaphorically speaking the great soldier's words are still true, but to-day they must be qualified to the extent that a modern army moves from one battle to another largely in rubber-shod, petrol-driven vehicles. It would be difficult, therefore, to overestimate the importance in the present war of the two commodities—rubber and oil—the indigenous supplies of which I propose to discuss in this chapter. India possesses neither rubber nor oil in abundance, but she has enough of both to make that little difference which gives a commodity a place in the strategic picture. This applies particularly to rubber, which I will discuss first. The reader can glimpse the uses and the universality of rubber in warfare when I say that a battleship, for instance, uses up as much rubber as is needed for making 17,000 automobile tyres, a 28-ton tank's rubber requirements equal 124 tyres, a 10-ton pontoon bridge 260, a 75 mm. gun carriage calls for 175 lbs. of rubber, and the tyres on a Flying Fortress weigh 100 pounds each—five times as large as the average passenger car, and subject to a great deal more wear and tear.

Fuller statistics of the indigenous industry are given below, but in the meantime it is interesting to note that about three-quarters of the rubber grown in India is produced in the self-governing state of Travancore,

which is in South India and lies at approximately the same eighth degree of latitude north of the equator as the rubber-growing areas of Ceylon, Malaya and the Netherlands East Indies. According to an early scientific investigator "the prime requirements for raising rubber are two: high or well-drained land, and a hot steamy climate." This prescription would seem to fit many parts of India, but the fact is that only over a small part of South India has rubber-growing been seriously undertaken, though perfunctory attempts were made towards the end of last century to organise Para-rubber plantations in Bengal and Assam. Indeed, during a recent visit to the latter Province I found a small quantity of rubber being cultivated on a tea estate managed by a company that has a reputation for frugality and foresight.

At a time when the United Nations were sitting back in comfortable possession of the great rubber plantations of the Federated Malay States and the Netherlands East Indies, the 18,000 tons of raw rubber which South India can produce seemed a relatively insignificant drop in the bucket of the whole total upon which they could draw. However, the loss of Malay, Java, Sumatra and Burma in the first few months of the war with Japan brought about a change as unexpected as it was unfavourable to the Allies who, in view of their apparently everlasting resources of raw rubber, had been somewhat casual about building up stocks of reserves. Writing at the end of January 1942, *The Economist* declared that there were then signs that Britain had been taken very largely unawares by the disappearance of its rubber supplies. The position at that time was that stocks had not been built up on an adequate basis, there was no production of synthetic rubber and reclamation had been undertaken only

on a minimum scale. Castigating the British Government for its sins of omission, the paper declared that only on the score of reclamation could a case be made out against the industry itself. I mention this only to show how overnight, as it were, India's production became important; not because there is any prospect of an Indian export surplus relieving the shortages elsewhere, but because if India can meet the requirements of the large mechanised army and the air force now located in the country she will to that extent have relieved the strain on Britain and the United States of America. This is a consideration of some importance; though I fear it presupposes that the Indian rubber industry possesses some of the magic qualities of the widow's cruse. Rubber trees cannot be grown and brought into production in the twinkling of an eye. It is six to seven years before a rubber tree can be tapped. It is not to be expected, therefore, that there will be any early increase in the amount of natural raw rubber available to Indian manufacturers. India's deficiencies will have to be made up in other ways, and I discuss the possibilities of these later on in this chapter.

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Rubber planting, as distinct from the manufacture of rubber goods, in South India is an indigenous industry, *i.e.*, there are practically no European planters engaged in it. In Travancore it is very largely in the hands of an influential political and financial minority of Syrian Christians—a community whose origins have been freely debated by ethnographists. That the growers of rubber have not come too badly out of the first two and a half years of war is clear from the fact that at the outbreak of War, No. 1 quality Rubber Sheet was being sold in India at about 18 $\frac{1}{2}$

cents per lb. This represented a big increase over the lowest level to which raw rubber prices had descended in previous years, and was welcomed by the planting industry as assuring them a reasonable profit. Since the outbreak of war, and until maximum prices of rubber were fixed by the Government of India at the beginning of June 1942, the price had risen to 61 cents per lb., and, even allowing for wartime increases in production costs, it would appear that at this latter figure the profit to planters must have been very satisfactory. Government, however, have pegged the maximum price at 71 cents per lb., having accepted the argument that fixation at this level was necessary if the maximum production of all rubber available was to be secured from South India. It would certainly appear that at such a level the grower has every inducement, from the profit angle, to produce and sell all the rubber he can.

Rubber manufacturers in India before the war mainly relied on raw rubber grown in South India or Burma. Up to the outbreak of war, South India was producing about 17,500 tons per annum, and a further 3,000 tons per annum were being imported from Burma. This rubber, which was of varying grades, was fully up to the standard of raw rubber grown in other areas such as Malaya, and was more than sufficient for Indian manufacturers' requirements up to the end of 1939. At that time Indian manufacturers consumed some 12,000 or 13,000 tons per annum. Thus, there was a definite surplus of India and Burma rubber which was available for export to other parts of the world. The outbreak of war, and subsequent events, entirely changed the prospect. Burma rubber is, of course, not now available and, at the moment, the maximum raw rubber that can be produced in South India is some

18,000 tons per annum, and it is unlikely that this figure can be increased by more than one to two thousand tons in the next half dozen years. Manufacturers' requirements, on the other hand, have increased by leaps and bounds, and, although, with strict control by Government of the items manufactured, the supply of India grown rubber may just about suffice for 1942, it is very clear that by itself it will be quite inadequate to war demands during 1943 and subsequent years. From trade estimates of vital war requirements given to me, it appears likely that in 1943 the Indian tyre industry alone will require some 21,000 tons or more rubber, and, as a very rough figure, the whole rubber industry in India, by the end of 1943, will be using up raw rubber at the rate of 28,000 tons per annum. This means that, as far as can be foreseen at present, a deficiency of some 10,000 tons per annum of raw rubber will have to be made up if India's essential war manufactures of different kinds are not to be held up. As it is most unlikely that a synthetic rubber plant will be put down in India, owing to the very heavy and expensive nature of the project, and the big developments in this field which are now going on in England and America, the most obvious ways of making up the deficiency, in addition to enforcing the greatest possible economy in the use of rubber, is by the greater production and use of what the trade calls "Reclaim," and the importation into India of additional stocks of raw rubber from the only available producing country still remaining in the neighbourhood, namely, Ceylon.

Steps are already being taken by Government to instal two Reclaim plants which should be in production this autumn, and be capable of turning out between them 6,000 tons per annum of reclaimed rubber. It is

anticipated that, with the aid of Government regulations enough scrap rubber, chiefly in the form of old tyres, should be forthcoming to produce this quantity of Reclaim, which will substantially assist to make up the shortage of raw rubber. Incidentally, this Indian Reclaim plant will treat scrap received from the Middle East on behalf of His Majesty's Government, which will add very considerably to the importance of the project. None the less this still leaves India with a deficiency of five or six thousand tons of raw rubber to make up, and not unnaturally she now looks to her great rubber producing neighbour Ceylon, with whom in fact she has succeeded in doing a satisfactory deal. Ceylon normally produces 110,000 tons of raw rubber per annum. In the past the vast majority of this has been exported to Britain or the U.S.A. and, latterly, to Russia. The agreement between the Indian and Ceylon Governments envisages an arrangement whereby Ceylon, which previously obtained nearly all her tyre requirements by import from England or America, is to be assured of her essential tyre requirements for war purposes from India. In exchange she provides India with enough raw rubber, not only to manufacture tyres for use in her own territory, but also with a surplus to make up the deficiency between India's total stocks of raw rubber, plus Reclaim, and her total manufacturing requirements.

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Under present conditions, and by reason of the very heavy demands of the Services in India for their vehicles, it can be said, as a rough estimate, that probably 80% of the rubber goods manufactured in the country to-day are in the form of tyres, and of these the vast majority are truck tyres. The two sources of supply

for tyres of this type are the Dunlop Rubber Co. (India) Ltd., and the Firestone Tyre and Rubber Co. of India Ltd., both of whom manufacture in this country. Both their plants are being expanded to meet Army requirements, and it is estimated that by the end of 1942 they will be, between them, turning out the following quantities of tyres per annum :—

Truck Tyres	..	..	..	..	340,000
Car Tyres	..	..	..	..	50,000

The comparatively small quantity of car tyres being produced is due to the drastic cuts that have had to be made in the production of this class of goods, owing to shortage of rubber and the provision of car tyres only for approved war purposes. Over and above these, of course, a certain number of cycle tyres have still to be produced to ensure war workers getting to and from factories with the reduction of petrol rationing, and at the present moment approximately 1,870,000 cycle tyres per annum are being produced in India, this figure representing a cut in normal civilian production of just under 50%. Aeroplane tyre manufacture is also being energetically undertaken, but, owing to the necessity of installing special plant, full production will not be reached much before the end of the current year. Full production should be at the rate of 10,000/12,000 tyres per annum on the latest estimates.

After tyres, the biggest quantity of rubber for war requirements probably goes to the manufacture of ground sheets and respirators. These are now being turned out in India at the rate of approximately 200,000 ground sheets per month and 36,000 respirators a month. Large additional requirements of the latter, however, are not unlikely at an early date, but, in present circumstances, this must depend on the availability

of rubber, and can probably only be achieved at the sacrifice of other classes of war goods that are considered less important. Finally, the reader will appreciate that throughout India many of the smaller rubber factories are producing considerable quantities of the less obvious war requirements made from rubber. These are such things as surgical hose and sheeting, washers and all types of military footwear, belting, hose etc. In every case, the manufacture is strictly controlled by the Controller of Rubber Manufacture in the Supply Department, and without his permission no articles at all containing rubber can now be made, and through him alone can supplies of rubber be obtained.

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Remarkably little information concerning oil production and supply is available to the layman. No matter how diligent your enquiries may be, you will find it exceedingly difficult to build up a picture of the oil situation as a whole. For such a picture, if it was accurate and comprehensive, would be a complicated mosaic on a far larger canvas than can be accommodated in this chapter. I frankly confess that I would like to have been able to write more about Indian oil production, the facts of which, so far as I have been able to glean them, can be very briefly stated. That I am not able to dissertate at greater length is not due to any unwillingness on the part of individual oil companies or executives to help me; but because they too do not find it easy to relate their own immediate activities to the larger Empire or world whole, of which they are but a small and uncertain part. To take only one snag—all the authorities on the subject are agreed that all oil statistics are approximate, and must be regarded as such. For instance oil is measured by two

